DUPLICATE ALSO

NATIONAL
METEOROLOGICAL
12 JUL 1999
LIBRARY

UK METEOROLOGICAL OFFICE
GLOBAL DATA MONITORING REPORT

June 1999

Data Assimilation
Meteorological Office
London Rd
Bracknell
Berkshire
RG12 2SZ

This report has not been published. Permission to quote from it should be obtained from the Head of Data Assimilation

ORGS UKMO U

National Meteorological Library
FitzRoy Road, Exeter, Devon. EX1 3PB

Distribution List

Mr B Sumner	NMC, Victoria, Australia
Dr S. C. Chou	CPTEC/INPE, Brazil
Dr V Wagner	Deutscher Wetterdienst, Hamburg, Germany
Mr M Engels	German Military Geophysical Office, Mont Royal, Germany.
Ms C Nelson	NMC, Washington, USA
Mr H Benichou	SCEM METEO-FRANCE.
Mr E A Meindl	National Data Buoy Centre, Stennis Space Center, USA
Mr G Verner	Canadian Meteorological Centre, Quebec, Canada
Permanent Rep. with WMO	Moscow, Russia
Hydrometcentre of the Russian Federation	Moscow, Russia
Mr Ima'izumi Takao	JMA, Tokyo, Japan
Mr Francois Lalaurette	Head, Meteorological Operations Section, ECMWF, Reading, UK
Dr M J Uddstrom	Met. Service, Wellington, New Zealand
Mr R S Bell	Met. Office, Bracknell, UK
Dr R Bromley	Met. Office, Bracknell, UK
Dr P K James	Met. Office, Bracknell, UK
Mr D A Jenkins	Met. Office, Bracknell, UK
Mr R W Lunnon	Met. Office, Bracknell, UK
Dr B Macpherson	Met. Office, Bracknell, UK
Mr B Oatway	Met. Office, Bracknell, UK
Mr C A Parrett	Met. Office, Bracknell, UK
National Meteorological Library	Met. Office, Bracknell, UK

CONTENTS

1. Introduction

2. Global Data Monitoring Statistics

3. Composite Observing Systems for the North Atlantic (COSNA)

...oooOOOooo...

1. Introduction

As the WMO-appointed lead centre for monitoring surface marine data, the U.K. Meteorological Office produces monthly statistics on the quality of these observations received at RSMC Bracknell. This report includes this information along with statistics for most other types of data. The figures and tables contained herein are presented according to the agreed standards for the exchange of monitoring results.

The report is based on data received at the UK Meteorological Office Headquarters, Bracknell in time for inclusion into the appropriate analysis (the current cut-off time is approximately 7.2 hours after each analysis time). The evaluation of data quality is based on comparison with the appropriate 6-hour global model forecast (background field). Generally, the background field is of high quality except in data sparse areas, tropical regions and areas close to steep orography where care should be taken in interpreting the statistics shown.

Comments or queries on the report are welcome and should be addressed to:-

Dr. B. Macpherson
Head of Observation Processing and Monitoring Section
Data Assimilation
Meteorological Office
London Road
Bracknell
Berkshire
United Kingdom
RG12 2SZ

2 Global Data Monitoring Statistics

Ships, Fixed buoys, Platforms and Drifting buoys observations

TABLES 1-2 contain lists of the stations which are considered to have returned suspect observations of pressure, windspeed, wind direction or temperature, as appropriate, during the month. The criteria for quality control are given on the header page for each table.

Figures 1 and 2 show 10 degree lat/long box average numbers of SHIP/SYNOP and DRIFTER observations received per day throughout the month at Bracknell and assimilated into model runs. Only data from the main hours of 00 UTC, 06 UTC, 12UTC and 18 UTC are included. Box average values are plotted as the nearest whole number (values of x.5 are rounded up). Where the average is more than 999, then 999 is plotted. A box with no observations is blank. If the 24 hour average >0 but <0.5, then 0 is plotted.

Synop Observations

Table 3 contains a list of stations which are considered to have returned suspect observations of Pressure during the month. The criteria for quality control are given in the header page. The reporting practice of each station is included in the list of statistics.

At RSMC Bracknell, for synoptic stations at or below a height of 500 metres, reported mean sea-level pressure is used in the statistics. If this is unavailable the mean sea-level pressure is calculated from the reported station-level pressure and temperature.

For synoptic stations above 500 metres, the mean sea-level pressure is calculated from the reported station-level pressure and temperature, or, if these are not available the height of a standard pressure-level (e.g.: 850 hPa or 700 hPa). If neither of these are available, the reported mean sea-level pressure is used.

Some stations vary their reporting practice according to the observation hour (e.g.: some stations in the CIS report both mean sea-level and station-level pressure at 00 & 12 UTC, but only mean sea-level pressure at 06 & 18 UTC). For monitoring purposes, reported mean sea-level pressure is stored separately from that calculated from station-level pressure or height of a standard pressure-level. Only statistics for the preferred method (see above) are presented in this report, and so for certain high-level stations, such as those from the CIS, approximately half of the number of observations actually received will appear in the statistics.

Aircraft observations

TABLE 4 contains a list of statistics calculated from data received from all airline carriers.

Figure 3 shows 10 degree lat/long box average numbers of aircraft reports (in AIREP/AMDAR code, including AIREPs, ACARs, AMDARs and ASDARs) received per day throughout the month at Bracknell and assimilated into model runs in the layer 70-500 hPa. Observations with a vector wind difference (compared with the model background field) of >60 m s^{-1} have been excluded. Box average values are plotted as the nearest whole number (values of x.5 are rounded up). Where the average is more than 999, then 999 is plotted. A box with no observations is blank. If the 24 hour average >0 but <0.5, then 0 is plotted.

Figures 4-7 show wind statistics for AIREP/ASDAR (in AIREP/AMDAR code, including AIREPs, ACARs, AMDARs and ASDARs) in the layer 70-500 hPa. Observations with a vector wind difference > 60 m s^{-1} have been excluded. Statistics have not been calculated for 10 degree lat/long boxes containing <31 observations.

Figure	Parameter
4	Mean wind vectors
5	Mean observation - background wind vector
6	Mean observation-background speed (m s^{-1})
7	RMS observation-background vector (m s^{-1})

Radiosonde Observations

TABLES 5-7 contain lists of the stations which are considered to have returned suspect observations of geopotential height, vector wind or wind direction, as appropriate, during the month. The criteria for quality control are given on the header page for each table.

Figures 8 and 9 show 10 degree lat/long box average numbers of TEMP 500 hPa GEOPOTENTIAL HEIGHT and TEMP/PILOT 300 hPa WIND observations received per day throughout the month at Bracknell and assimilated into model runs. Data from all hours are included. Box average values are plotted as the nearest whole number (values of x.5 are rounded up). Where the average is more than 999, then 999 is plotted. A box with no observations is blank. If the 24 hour average >0 but <0.5, then 0 is plotted.

APPENDIX I shows details of the gross error limits used in TABLES 5 and 6 and the weights used in the RMS values in TABLE 5.

Satellite Observations

Figures 10-24 show satellite wind statistics for all geostationary satellites. All plots other than **AVAILABILITY** show average data where there are > 10 observations in a 10 degree lat/long box.

Figure	Parameter Plotted	Layer (hPa)
10	Availability/average daily number	701-1000
11	Vector mean wind (observed)	701-1000
12	Observation-background vector wind difference	701-1000
13	Mean observation-background speed differences	701-1000
14	RMS observation-background vector difference	701-1000
15	Availability/average daily number	401-700
16	Vector mean wind (observed)	401-700
17	Observation-background vector wind difference	401-700
18	Mean observation-background speed differences	401-700
19	RMS observation-background vector difference	401-700

Figure	Parameter Plotted	Layer (hPa)
20	Availability/average daily number	101-400
21	Vector mean wind (observed)	101-400
22	Observation-background vector wind difference	101-400
23	Mean observation-background speed differences	101-400
24	RMS observation-background vector difference	101-400

Figures 25-39 show sounding statistics from the polar orbitting satellite NOAA-15. Figure 25 shows the mean daily number of ATOVS soundings, and figures 26-39 show mean and standard deviation observation-background differences for brightness temperature, for selected channels.
N.B. The sounding data is bias-corrected (and thinned) before being assimilated in the UKMO NWP model.

Figure		Weighting function peak (hPa)
26	Mean	Surface (HIRS8)
27	SD	Surface (HIRS8)
28	Mean	700 (HIRS15)
29	SD	700 (HIRS15)
30	Mean	500-700 (HIRS11)
31	SD	500-700 (HIRS11)
32	Mean	400 (HIRS4)
33	SD	400 (HIRS4)
34	Mean	700 (AMSUA5)
35	SD	700 (AMSUA5)
36	Mean	300 (AMSUA7)
37	SD	300 (AMSUA7)
38	Mean	100 (AMSUA9)
39	RMS	100 (AMSUA9)

3 Composite Observing Systems for the North Atlantic (COSNA)

This section shows statistics for upper air (radiosonde and aircraft) and surface (drifter) data for the North Atlantic area for data received at Bracknell during the month.

TABLE 8 shows quality statistics for **Mean Sea-level Pressure, Windspeed and Wind Direction** received at Bracknell in DRIFTER code during the month for the area 10°N - 80°N, 85°W - 0°W.

TABLE 9 shows quality statistics for **Temperature and Vector Wind** received at Bracknell from aircraft during the month for the area 40°N - 70°N, 60°W - 0°W.

Table 10 - 13 show quality statistics **(Geopotential Height and Windspeed at 100 and 500 hPa)** for all TEMPSHIPS in the area bounded by 0°N - 90°N, 100°W - 40°E and selected TEMP stations within the same area.

Revisions

1. May 95 Monitoring statistics for NOAA-11 removed. Figures 25-27 now show data for NOAA-12
2. May 95 Notes giving details of observations included in wind direction statistics clarified and corrected.
3. August 95 Monitoring statistics for NOAA-14 added with figures 28-30.
4. February 96 Monitoring statistics for GOES-7 have been replaced by statistics for GOES-8 and GOES-9.
5. April 96. 500 km and 120 km SATEMs replaced by 120 km resolution temperature profiles produced locally from the radiances disseminated by NESDIS.
6. February 97 Monitoring statistics for Meteosat 5 have been replaced by statistics for Meteosat 6.
7. Sept 97 Monitoring statistics for NOAA-12 removed. Figures 25-27 now show data for NOAA-11
8. January 1998. Increase in resolution of UKMO global forecast model.
9. April 1998. GOES winds ceased on 2nd March 1998, and were replaced with GOES high resolution winds from 15th.
10. June 1998. Monitoring statistics for Meteosat-6 were replaced by monitoring statistics for Meteosat-7, from 3rd June.
11. June 1998. Corrections in our processing of radiosonde data resulted in a decrease in the number of 500hPa geopotential heights in Figure 8 of about 230 per 24 hours (compared with previous reports), and a small increase in the number of 300hPa winds in Figure 9.
12. July 1998. Meteosat-5 began transmitting winds from 2nd July, at 63 degrees East (over the Indian ocean), and this data is included in the statistics.
13. July 1998. GOES-9 (at 135W) was replaced mid-month by GOES-10 (initially at 105W, moving towards 135W).
14. February 1999. Problems with NOAA-11, and TOVS data ceased to be assimilated from 26 February.
15. March 1999. UKMO introduced 3-D VAR assimilation system on 29 March, and also began assimilating ATOVS data from NOAA-15.
16. May 1999. Included statistics for ATOVS sounding data from NOAA-15.

TABLE 1

MONITORING OF MARINE SURFACE OBSERVATIONS
MONTHLY SUSPECT LIST - SHIPS, FIXED BUOYS AND PLATFORMS
MONITORING CENTRE: BRACKNELL
MONTH: June 1999

Monitoring procedures

Period		:One calendar month.
Data monitored		:Reports from each unique identifier for ships, fixed buoys and platforms.
Standard of comparison		:Background field from UKMO global model.
Observation times		:00, 06, 12, 18 UTC
Elements monitored		:Mean sea level pressure (hPa). :Wind speed (m s^{-1}). :Wind direction (Degrees).
Parameters monitored		
	:NOBS	:Number of observations received excluding duplicates.
	:NGE	:Number of observations with gross errors.
	:PGE	:Percentage of observations with gross errors.
	:SD	:SD of difference of observations from background values excluding those with gross errors.
	:BIAS	:Mean difference of observations from background values excluding those with gross errors. **N.B. a positive bias indicates the observation is veered to the background.**
	:RMS	:Root Mean Square difference of observations from background values excluding those with gross errors.

GROSS ERROR LIMIT	:15 hPa (pressure) :25 m s^{-1} (vector wind)		
SELECTION CRITERIA	:NOBS	≥ 20 , and one or more of the following:	
	1.| bias|	≥ 4 hPa	(pressure),
		≥ 5 m s^{-1}	(wind speed),
		≥ 30 degrees	(direction).
	2.SD	> 6 hPa	(pressure),
		≥ 80 degrees	(direction).
	3.PGE	≥ 25	

N.B. Observations of wind direction are only included in the wind direction statistics if the observed OR background wind speed > 5 m s^{-1}

IDENTIFIER	HOUR	ELEM	LEVEL	NOBS	NGE	PGE	SD	BIAS	RMS
MEAN SEA LEVEL PRESSURE									
C6PE4	ALL	P	SUR	31	0	0	2.2	-4.1	4.6
C6PZ3	ALL	P	SUR	43	0	0	1.3	9.6	9.7
ELVI2	ALL	P	SUR	44	0	0	1.1	-4.5	4.7
LAFQ5	ALL	P	SUR	20	1	5	2.6	-4.8	5.4
LATI4	ALL	P	SUR	49	0	0	3.2	-4.7	5.7
PCCZ	ALL	P	SUR	20	0	0	1.4	6.3	6.5
PJKP	ALL	P	SUR	27	0	0	1.8	-4.2	4.5
P3YS5	ALL	P	SUR	98	0	0	1.4	4.6	4.8
UAMQ	ALL	P	SUR	21	0	0	2.6	-4.8	5.4
UCJB	ALL	P	SUR	24	0	0	1.0	-5.7	5.8
UCMV	ALL	P	SUR	26	8	31	0.9	-0.5	1.0
UCTW	ALL	P	SUR	29	0	0	1.8	6.6	6.9
UDUE	ALL	P	SUR	30	0	0	0.7	13.0	13.0
UDYN	ALL	P	SUR	62	1	2	2.5	6.3	6.8
UICO	ALL	P	SUR	60	0	0	3.0	4.1	5.1
VCRQ	ALL	P	SUR	20	20	100			
VCTQ	ALL	P	SUR	24	0	0	3.5	-4.0	5.3
VVGG	ALL	P	SUR	20	0	0	1.9	5.8	6.1
VYNG	ALL	P	SUR	33	33	100			
WDZB	ALL	P	SUR	22	0	0	1.5	-5.4	5.6
ZCAM9	ALL	P	SUR	41	2	5	2.4	10.0	10.3
ZSDN	ALL	P	SUR	21	0	0	1.3	4.5	4.7
3FFG7	ALL	P	SUR	24	0	0	1.1	-4.0	4.2
3FGQ3	ALL	P	SUR	56	0	0	0.8	8.5	8.5
48102	ALL	P	SUR	416	193	46	1.0	0.4	1.1
48111	ALL	P	SUR	652	293	45	1.0	-0.5	1.1
62026	ALL	P	SUR	443	209	47	4.2	1.7	4.6
62138	ALL	P	SUR	59	0	0	2.6	4.8	5.5
62142	ALL	P	SUR	630	0	0	0.9	4.1	4.2
WIND SPEED									
DGSE	ALL	SPEED	SUR	47	0	0	5.1	5.7	7.6
DUXW	ALL	SPEED	SUR	32	0	0	4.1	5.9	7.2
ELWC6	ALL	SPEED	SUR	23	0	0	5.6	11.3	12.6
LAWO2	ALL	SPEED	SUR	21	0	0	4.1	11.5	12.2
MXHR6	ALL	SPEED	SUR	23	0	0	5.4	5.3	7.6
MXSD6	ALL	SPEED	SUR	39	0	0	7.0	5.3	8.8
P3KZ7	ALL	SPEED	SUR	56	0	0	5.2	6.2	8.1
SYMK	ALL	SPEED	SUR	47	0	0	1.8	5.4	5.7
VRUZ7	ALL	SPEED	SUR	22	0	0	4.0	7.3	8.4
V2TE	ALL	SPEED	SUR	21	0	0	6.5	5.3	8.4
V2TN	ALL	SPEED	SUR	35	0	0	3.1	5.6	6.4
WIND DIRECTION									
LAVD4	ALL	DIRN.	SUR	21	0	0	20.8	30.0	36.5
MQVF8	ALL	DIRN.	SUR	24	0	0	46.1	31.1	55.6
ZCAV6	ALL	DIRN.	SUR	25	0	0	19.2	-31.6	36.9

AVAILABILITY - SHIP/SYNOP - JUNE 1999
MAIN HOURS ONLY
10 DEGREE BOX AVERAGE NUMBER OF OBSERVATIONS IN 24 HOURS
GLOBAL AVERAGE NUMBER OF OBSERVATIONS IN 24 HOURS = 21430

FIGURE 1

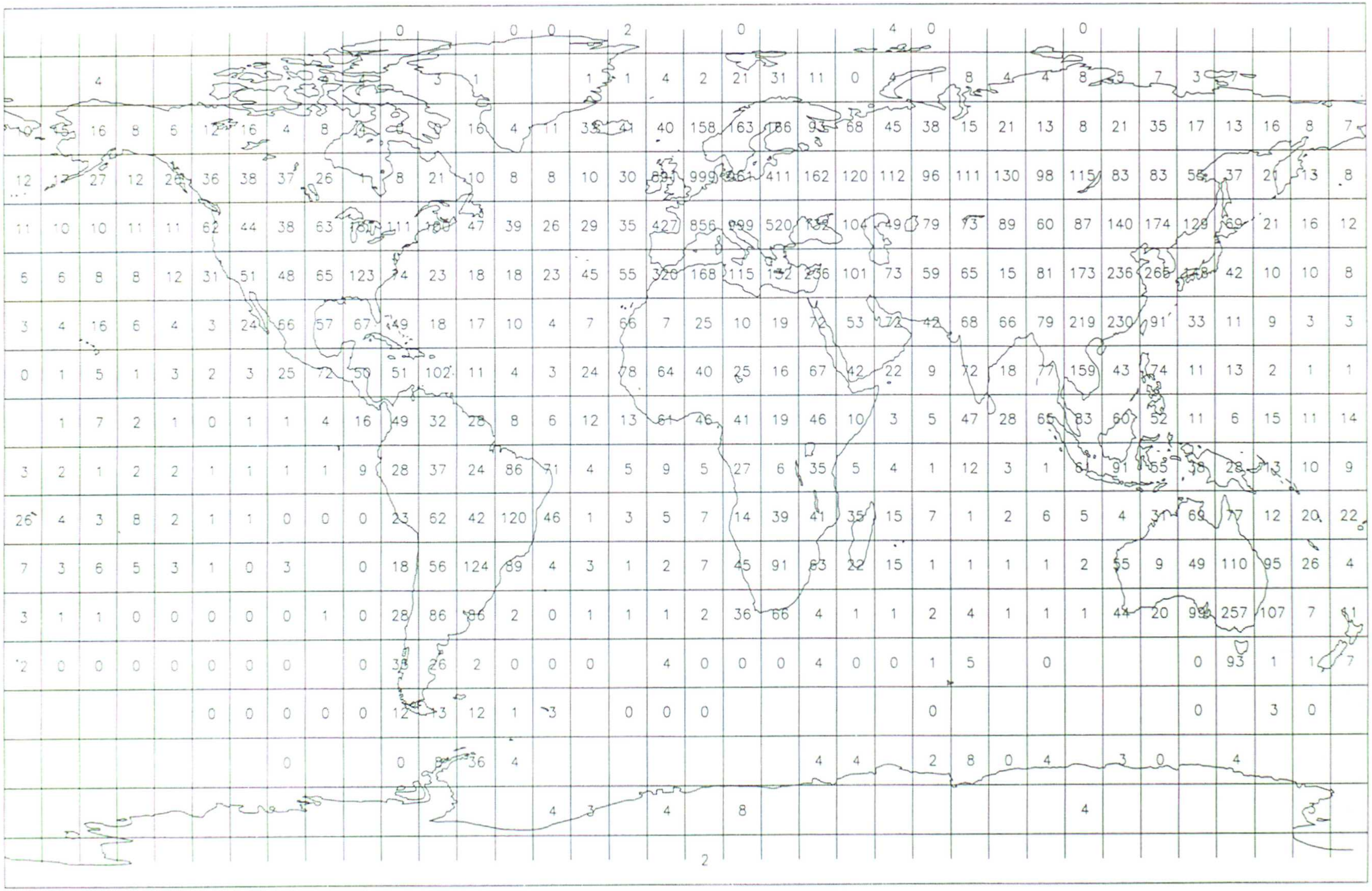

0 0 0 2 0 4 0 0
4 3 1 1 1 4 2 21 31 11 0 4 1 8 4 4 8 5 7 3 7
10 15 16 8 6 12 16 4 8 16 4 11 33 41 40 158 163 186 93 68 45 38 15 21 13 8 21 35 17 13 16 8 7
12 17 27 12 26 36 38 37 26 1 8 21 10 8 8 10 30 891 999 961 411 162 120 112 96 111 130 98 115 83 83 56 37 21 13 8
11 10 10 11 11 62 44 38 63 181 111 180 47 39 26 29 35 427 856 999 520 132 104 49 79 73 89 60 87 140 174 129 69 21 16 12
6 6 8 8 12 31 51 48 65 123 74 23 18 18 23 45 55 320 168 115 152 236 101 73 59 65 15 81 173 236 265 148 42 10 10 8
3 4 16 6 4 3 24 56 57 67 49 18 17 10 4 7 66 7 25 10 19 72 53 172 42 68 66 79 219 230 91 33 11 9 3 3
0 1 5 1 3 2 3 25 72 50 51 102 11 4 3 24 78 64 40 25 16 67 42 22 9 72 18 77 159 43 74 11 13 2 1 1
1 7 2 1 0 1 1 4 16 49 32 28 8 6 12 13 61 46 41 19 46 10 3 5 47 28 65 83 60 52 11 6 15 11 14
3 2 1 2 2 1 1 1 1 9 28 37 24 86 71 4 5 9 5 27 6 35 5 4 1 12 3 1 61 91 55 38 28 13 10 9
26 4 3 8 2 1 1 0 0 0 23 62 42 120 46 1 3 5 7 14 39 41 35 15 7 1 2 6 5 4 31 69 77 12 20 22
7 3 6 5 3 1 0 3 0 18 56 124 89 4 3 1 2 7 45 91 63 22 15 1 1 1 1 2 55 9 49 110 95 26 4
3 1 1 0 0 0 0 0 1 0 28 86 86 2 0 1 1 1 2 36 66 4 1 1 2 4 1 1 1 44 20 99 257 107 7 11
2 0 0 0 0 0 0 0 0 38 26 2 0 0 0 4 0 0 0 4 0 0 1 5 0 0 93 1 1 7
0 0 0 0 0 12 13 12 1 3 0 0 0 0 0 3 0
0 0 8 36 4 4 4 2 8 0 4 3 0 4
4 3 4 8 4
2

TABLE 2

MONITORING OF MARINE SURFACE OBSERVATIONS
MONTHLY SUSPECT LIST - DRIFTING BUOYS
MONITORING CENTRE: BRACKNELL
MONTH: June 1999

Monitoring procedures

Period		:One calendar month.	
Data monitored		:Reports from each unique identifier for drifting buoys.	
Standard of comparison		:Background field from UKMO global model.	
Position		:Average latitude and longitude for period.	
Observation times		:00, 06, 12, 18 UTC	
Elements monitored		:Mean sea level pressure (hPa). :Wind speed (m s^{-1}). :Wind direction (degrees).	
Parameters monitored	:NOBS	:Number of observations received excluding duplicates.	
	:NGE	:Number of observations with gross errors.	
	:PGE	:Percentage of observations with gross errors.	
	:SD	:SD of difference of observations from background values excluding those with gross errors.	
	:BIAS	:Mean difference of observations from background values excluding those with gross errors. **N.B. a positive bias indicates the observation is veered to the background.**	
	:RMS	:Root Mean Square difference of observations from background values excluding those with gross errors.	
GROSS ERROR LIMIT	:15 hPa :25 m s^{-1}	(pressure) (vector wind)	
SELECTION CRITERIA :	NOBS	≥ 20 , and one or more of the following:	
	1.| bias|	≥ 4 hPa ≥ 5 m s^{-1} ≥ 30 degrees	(pressure), (wind speed), (direction).
	2.SD	≥ 6 hPa ≥ 80 degrees	(pressure), (direction).
	3.PGE	≥ 25.	

N.B. Observations of wind direction are only included in the wind direction statistics if the observed OR background wind speed > 5 m s^{-1}

IDENTIFIER	LAT.	LONG.	HOUR	ELEM	LEVEL	NOBS	NGE	PGE	SD	BIAS	RMS
MEAN SEA LEVEL PRESSURE											
34915	-34.3	-92.7	ALL	P	SUR	259	11	4	3.5	5.6	6.6
54924	-49.9	-146.3	ALL	P	SUR	268	95	35	4.7	0.2	4.7
56608	-36.5	64.2	ALL	P	SUR	255	81	32	5.1	-3.7	6.3
64691	65.9	-27.8	ALL	P	SUR	472	70	15	3.9	8.7	9.5
65592	62.2	-16.6	ALL	P	SUR	99	17	17	5.7	-5.7	8.1
WIND SPEED											
15540	-35.6	-1.8	ALL	SPEED	SUR	157	0	0	4.2	-5.0	6.5
WIND DIRECTION											
52624	-14.2	138.1	ALL	DIRN.	SUR	189	0	0	20.5	32.3	38.3
55587	-42.5	170.3	ALL	DIRN.	SUR	353	0	0	35.3	32.0	47.6

AVAILABILITY – DRIFTER – JUNE 1999

FIGURE 2

MAIN HOURS ONLY

10 DEGREE BOX AVERAGE NUMBER OF OBSERVATIONS IN 24 HOURS

GLOBAL AVERAGE NUMBER OF OBSERVATIONS IN 24 HOURS = 6570

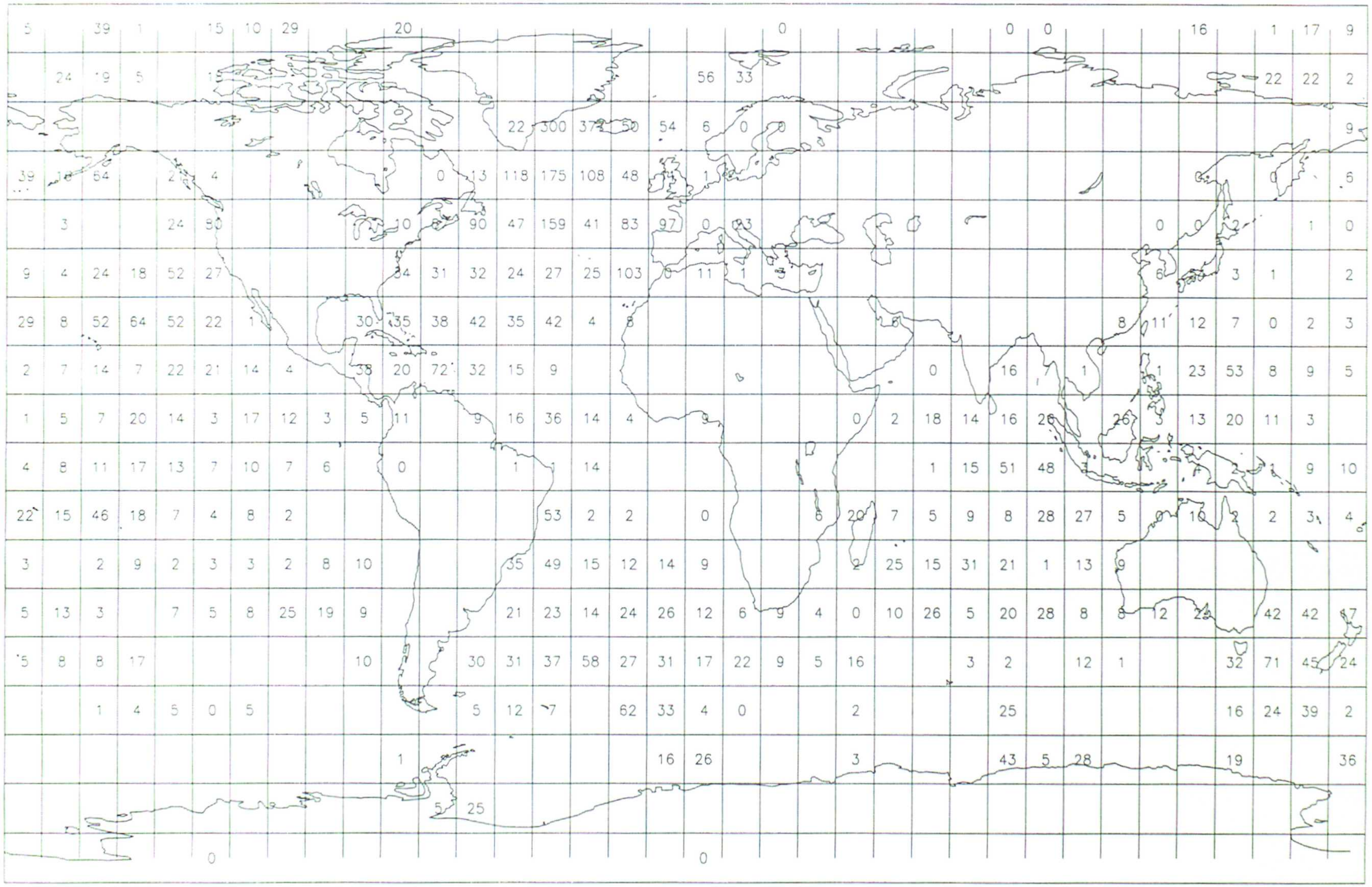

5 39 1 15 10 29 20 0 0 0 16 1 17 9
24 19 5 15 56 33 22 22 2
22 300 37 50 54 6 0 0 9
39 10 64 24 4 0 13 118 175 108 48 14 1 0 0 6
3 24 50 10 8 90 47 159 41 83 97 0 23 0 0 2 1 0
9 4 24 18 52 27 34 31 32 24 27 25 103 0 11 1 5 6 3 1 2
29 8 52 64 52 22 1 30 35 38 42 35 42 4 8 6 8 11 12 7 0 2 3
2 7 14 7 22 21 14 4 38 20 72 32 15 9 0 16 1 1 1 23 53 8 9 5
1 5 7 20 14 3 17 12 3 5 11 9 16 36 14 4 9 0 2 18 14 16 26 26 3 13 20 11 3
4 8 11 17 13 7 10 7 6 0 1 1 14 1 15 51 48 3 4 2 1 9 10
22 15 46 18 7 4 8 2 53 2 2 0 6 20 7 5 9 8 28 27 5 0 10 2 2 3 4
3 2 9 2 3 3 2 8 10 35 49 15 12 14 9 2 25 15 31 21 1 13 9
5 13 3 7 5 8 25 19 9 21 23 14 24 26 12 6 9 4 0 10 26 5 20 28 8 8 12 23 42 42 47
5 8 8 17 10 30 31 37 58 27 31 17 22 9 5 16 3 2 12 1 32 71 45 24
1 4 5 0 5 5 12 7 62 33 4 0 2 25 16 24 39 2
1 16 26 3 43 5 28 19 36
5 25
0 0

TABLE 3

MONITORING OF LAND SURFACE OBSERVATIONS
MONTHLY SUSPECT LIST - SYNOPS & AUTOSYNOPS
MONITORING CENTRE: BRACKNELL
MONTH: June 1999

Monitoring procedures

Period		:One calendar month.
Data monitored		:Reports from each unique identifier for synops & autosynops.
Standard of comparison		:Background field from UKMO global model.
Observation times		:00, 06, 12, 18 UTC
Elements monitored		:Mean sea level pressure (hPa).
Parameters monitored	:HT(m)	:Station height (in metres) as given in WMO No. 9 Vol A
	:RP	:Pressure reporting practice M=mean sea level pressure (hPa) reported. S=Station level pressure reported. 8=Geopotential height (m) of 850 hPa surface reported. 7=Geopotential height (m) of 700 hPa surface reported.
	:NOBS	:Number of observations received excluding duplicates.
	:NGE	:Number of observations with gross errors.
	:PGE	:Percentage of observations with gross errors.
	:%REJ	:Percentage of observations flagged excluding those with gross errors.
	:SD	:SD of difference of observations from background values excluding those with gross errors.
	:BIAS	:Mean difference of observations from background values excluding those with gross errors.
	:RMS	:Root Mean Square difference of observations from background values excluding those with gross errors.
GROSS ERROR LIMIT	:15 hPa	(pressure)
SELECTION CRITERIA	:NOBS	≥ 20 ,and one or more of the following:
	1.| bias|	≥ 4 hPa
	2. SD	≥ 6 hPa
	3.PGE	> 25.

N.B. For stn ht ≥ 500m, mslp is that calculated from station level pressure where available.
For stn ht < 500m, mslp is that as reported by the station where available.

WMO REGION 1:

STATION	LAT	LONG	HT(M)	RP	NOBS	NGE	PGE	%REJ	SD	BIAS	RMS
60010	28.3N	16.5W	2367	S7	82	0	0	49	1.7	-7.7	7.9
60445	36.2N	5.4E	1081	S8	99	0	0	0	0.7	4.1	4.2
60468	35.6N	6.2E	1052	S8	110	109	99	0	0.0	-2.5	2.5
60511	35.3N	1.4E	1127	S8	103	34	33	0	0.6	14.1	14.1
60535	34.7N	3.3E	1144	S8	76	0	0	1	1.0	-6.3	6.4
60670	24.6N	9.5E	1054	S8	108	2	2	2	1.1	9.2	9.3
61492	16.1N	13.5W	18	MS	65	0	0	9	1.3	4.1	4.3
62805	11.8N	34.4E	474	MS	64	0	0	5	1.9	-4.5	4.9
63330	13.5N	39.5E	2070	MS	54	54	100	0			
63334	10.3N	37.7E	2515	MS	55	0	0	0	0.9	10.2	10.2
63402	7.7N	36.8E	1725	MS	82	1	1	23	1.4	5.6	5.8
63450	9.0N	38.8E	2354	MS	105	0	0	0	0.9	4.1	4.2
63453	8.9N	39.9E	930	S	75	0	0	8	1.2	-4.5	4.7
63471	9.6N	41.9E	1260	MS	98	1	1	1	1.2	8.9	9.0
63478	5.9N	43.6E	295	MS	72	0	0	3	1.6	6.2	6.4
63602	3.1N	30.9E	1204	S	42	40	95	0	3.9	6.4	7.5
68016	19.3S	12.7E	16	M	64	19	30	0	1.4	1.9	2.4
68350	26.7S	27.1E	1351	S8	115	0	0	33	3.7	5.2	6.4
68396	26.5S	31.3E	641	S8	51	0	0	2	1.4	4.3	4.5

WMO REGION 2:

STATION	LAT	LONG	HT(M)	RP	NOBS	NGE	PGE	%REJ	SD	BIAS	RMS
30320	56.9N	105.7E	669	MS	118	60	51	0	1.9	0.9	2.1
38069	44.2N	66.8E	153	M	107	2	2	0	1.1	-5.6	5.7
40700	39.6N	48.1E	45	MS	24	0	0	88	1.0	-4.7	4.8
40701	39.3N	44.4E	1470	MS	28	0	0	96	1.0	5.4	5.5
40743	36.2N	57.7E	941	MS	103	0	0	1	1.4	-6.0	6.2
40762	35.3N	59.2E	1333	MS	107	0	0	0	1.3	-12.5	12.6
40783	32.4N	49.7E	1972	MS	29	1	3	69	0.9	-5.0	5.1
40789	33.8N	55.1E	921	MS	26	0	0	85	2.6	5.2	5.8
40836	30.8N	51.7E	1880	MS	21	0	0	95	0.8	5.6	5.7
40859	29.0N	53.7E	1383	MS	27	0	0	100	0.6	6.8	6.8
41254	23.1N	57.7E	1755	S8	77	77	100	0			
41396	16.0N	48.9E	700	MS	35	0	0	0	0.8	5.9	6.0
41535	34.2N	73.3E	1308	8	43	0	0	5	1.8	-6.2	6.5
44416	28.6N	81.6E	720	MS	55	0	0	4	2.4	4.7	5.3
44477	27.0N	87.4E	1445	S8	58	58	100	0			
47022	40.8N	128.2E	1200	S	56	0	0	4	1.1	4.2	4.3
51495	43.5N	91.6E	874	M	118	0	0	0	1.2	7.3	7.4
52602	38.8N	93.4E	2734	S	118	0	0	0	1.1	-4.5	4.6
52955	35.6N	100.8E	3201	S	118	2	2	0	1.1	12.4	12.4
53588	39.0N	113.5E	2898	S	117	117	100	0			
54587	39.1N	123.2E	79	M	104	0	0	2	1.5	-4.4	4.6
56144	31.8N	98.6E	3184	S	107	2	2	0	1.6	-4.5	4.8
56385	29.5N	103.3E	3049	S	118	0	0	1	1.2	-4.7	4.9
56444	28.5N	98.9E	3488	S	116	62	53	14	0.5	13.9	13.9
56462	29.0N	101.5E	2994	S	118	1	1	1	1.2	8.2	8.3

WMO REGION 3:

STATION	LAT	LONG	HT(M)	RP	NOBS	NGE	PGE	%REJ	SD	BIAS	RMS
80099	7.1N	70.7W	128	MS	33	0	0	0	0.9	-5.4	5.5
80475	7.6N	72.1W	327	MS	76	0	0	97	1.4	5.3	5.5
82336	3.1S	58.4W	40	MS	83	0	0	0	1.9	-5.3	5.6
82704	7.6S	72.7W	170	MS	83	0	0	0	1.1	-4.1	4.2
83214	10.3S	54.9W	285	MS	63	0	0	0	1.0	-7.2	7.3
83235	12.4S	46.4W	604	MS	84	0	0	1	0.8	6.0	6.1
83319	14.7S	52.4W	315	MS	82	0	0	1	1.3	-5.8	5.9
83332	14.1S	46.4W	826	MS	87	2	2	1	0.7	13.1	13.1
83376	15.9S	49.0W	740	MS	87	0	0	34	0.7	-4.3	4.4

WMO REGION 3:

STATION	LAT	LONG	HT(M)	RP	NOBS	NGE	PGE	%REJ	SD	BIAS	RMS
83408	14.3S	43.8W	447	MS	79	0	0	0	0.7	9.8	9.8
83423	16.7S	49.3W	741	MS	86	2	2	2	0.7	-5.2	5.2
83488	17.8S	42.9W	1097	MS	78	77	99	0	0.0	10.1	10.1
83531	18.6S	46.5W	940	MS	79	2	3	1	1.0	-7.1	7.2
83587	19.9S	43.9W	850	MS	80	0	0	0	0.8	-6.4	6.4
83773	23.1S	48.9W	793	S	29	0	0	38	1.8	-8.3	8.5
83836	25.5S	50.6W	837	MS	84	0	0	1	1.0	-4.5	4.6
84401	5.2S	80.6W	49	S	62	0	0	0	1.0	5.3	5.4
84425	5.9S	76.1W	179	MS	29	0	0	0	1.0	4.1	4.2
84455	6.5S	76.4W	281	MS	48	0	0	0	1.0	6.0	6.1
84472	7.1S	78.5W	2620	S	34	0	0	0	0.7	-6.0	6.0
84686	13.6S	72.0W	3248	S	63	0	0	0	1.2	-5.6	5.7
84720	14.9S	75.0W	567	M	42	0	0	0	1.2	4.4	4.6
84782	18.1S	70.3W	468	MS	65	0	0	0	1.4	8.0	8.1
85312	19.8S	63.9W	992	S	46	2	4	4	1.2	-11.9	12.0
85406	18.3S	70.3W	55	M	115	0	0	1	1.8	4.9	5.2
85432	22.5S	68.9W	2320	S8	80	0	0	0	1.1	4.1	4.2
85836	43.6S	71.8W	277	M	39	0	0	5	2.3	5.6	6.1

WMO REGION 4:

STATION	LAT	LONG	HT(M)	RP	NOBS	NGE	PGE	%REJ	SD	BIAS	RMS
72376	36.8N	108.2W	1677	M	117	0	0	39	1.8	5.0	5.3
76118	30.4N	109.7W	1040	MS	40	0	0	0	0.7	-10.1	10.1
76632	20.1N	98.7W	2417	MS	38	0	0	0	0.5	-5.5	5.5
76658	19.2N	103.7W	494	MS	39	0	0	0	0.9	6.9	7.0
76750	18.5N	88.3W	9	MS	100	0	0	2	1.6	-7.8	8.0
76775	17.1N	96.7W	1550	MS	70	3	4	0	0.7	4.4	4.5
76845	16.7N	92.6W	2276	MS	104	103	99	0	0.0	5.2	5.2
78718	14.4N	87.6W	626	MS	40	33	83	0	2.9	-13.5	13.8

WMO REGION 5:

STATION	LAT	LONG	HT(M)	RP	NOBS	NGE	PGE	%REJ	SD	BIAS	RMS
91163	21.9N	159.6W	7	8	341	341	100	0			
94328	22.4S	133.6E	623	MS	110	0	0	0	0.6	6.6	6.6
94661	33.7S	136.5E	193	MS	50	0	0	60	4.0	4.4	5.9
94955	41.6S	145.7E	684	MS	115	115	100	0			
95909	36.5S	148.3E	1957	MS	118	118	100	0			
95952	41.9S	145.6E	560	MS	115	115	100	0			
96505	3.7N	115.7E	905	S8	37	34	92	0	1.1	2.9	3.1
96751	6.7S	106.9E	914	S8	65	64	98	0	0.0	-1.2	1.2

WMO REGION 6:

STATION	LAT	LONG	HT(M)	RP	NOBS	NGE	PGE	%REJ	SD	BIAS	RMS
01360	61.9N	7.9E	712	MS	113	0	0	0	0.7	5.6	5.6
04207	81.7N	59.9W	105	MS	84	0	0	0	0.8	-4.7	4.8
13593	41.3N	22.4E	1031	8	45	0	0	76	1.2	-4.5	4.7
16227	41.9N	13.6E	655	MS	338	329	97	0	0.9	-13.8	13.8
16614	40.4N	21.3E	604	MS	93	0	0	0	0.9	-6.6	6.7
17092	39.8N	39.5E	1218	S8	118	0	0	0	1.3	7.1	7.2
17203	38.9N	40.5E	1177	S8	116	0	0	0	1.1	4.0	4.1

ANTARCTIC:

STATION	LAT	LONG	HT(M)	RP	NOBS	NGE	PGE	%REJ	SD	BIAS	RMS
89272	75.0S	70.8W	1395	S	245	37	15	0	3.4	-11.2	11.7
89744	74.0S	43.0E	3353	S	275	0	0	0	1.6	7.0	7.2
89774	73.4S	76.8E	2563	S	273	0	0	0	1.7	4.1	4.4

TABLE 4

MONTHLY MONITORING OF AIRCRAFT OBSERVATIONS
MONITORING CENTRE: BRACKNELL
MONTH: June 1999

Monitoring procedures

Period		:One calendar month.
Data monitored		:Statistics for each airline carrier.
Area monitored		:90°N - 90°S, 180°W - 180°E.
Standard of comparison		:Background field from UKMO global model.
Observation times		:All hours combined.
Level(s) monitored		:70.0 - 500.0 hPa
Elements monitored		:TEMP in °C ; WIND in m s^{-1}
Parameters monitored		
	:N REP.	:Number of observations received excluding duplicates.
	:PG	:Percentage of observations with gross errors.
	:PR	:Percentage of observations rejected by quality control including rejections from the duplicate check.
	:PC	:Percentage of observations with calm winds.
	:RMS	:Root Mean Square difference of observations from background values excluding those with gross errors in Temperature & vector wind.
	:BIAS	:Mean difference of observations from background values excluding those with gross errors in Temperature & Wind Speed.
GROSS ERROR LIMITS		:10.0 °C ; 60 m s^{-1} Vector Wind
SELECTION CRITERIA		:N REP $\geq$ 20

NB: US ACARs and ADS data are shown at the bottom of the table as US ACAR and ADS respectively.

IDENT.	TEMPERATURE					WIND					
	N.REP.	PG	PR	RMS	BIAS	N.REP.	PG	PR	PC	RMS	BIAS
AAA	86	1	21	2.0	1.1	87	0	21	0	8.8	0.8
AAH	98	0	15	1.0	0.1	95	0	16	0	8.0	1.3
AAL	6843	1	19	1.7	0.2	6828	0	20	0	8.7	1.1
AAR	1375	0	7	1.8	-0.3	1346	0	8	0	8.8	0.5
ACA	2725	1	8	1.9	0.0	2753	0	8	0	7.3	0.7
ACI	43	5	47	1.3	0.5	43	0	44	0	8.2	2.1
AEA	503	0	6	2.5	1.1	474	0	7	0	8.1	0.8
AEL	431	0	15	2.5	0.7	446	0	14	0	8.3	0.7
AEY	67	1	4	2.1	0.9	69	0	4	0	9.6	0.7
AFL	608	1	9	2.2	0.7	611	0	10	0	9.0	0.9
AFR	2062	1	12	1.7	0.1	2092	0	13	0	9.2	0.9
AIH	141	1	6	1.4	0.2	137	1	7	0	8.8	1.4
AJM	21	0	10	1.1	-0.1	22	0	9	0	7.4	0.6
AMM	88	0	2	1.7	0.3	87	0	3	0	7.1	-0.4
AMT	1026	0	41	1.6	0.7	1028	0	41	0	6.0	0.5
AMX	354	1	6	2.1	0.0	353	0	5	0	8.3	1.2
ANA	1425	0	6	1.9	-0.2	1413	0	8	0	8.2	0.9
ANZ	4181	1	37	1.9	-0.1	4109	0	37	0	7.7	0.8
AOM	846	1	8	1.8	1.0	845	0	8	0	7.0	0.7
ARG	42	7	21	3.3	-0.1	42	2	17	0	13.5	4.0
ASY	37	0	35	2.0	1.5	35	3	40	0	9.1	1.3
AUA	22	0	18	2.4	0.6	23	0	17	0	6.7	0.7
AVA	521	1	6	1.9	0.3	521	0	4	0	6.8	0.5
AVE	259	0	3	2.0	1.1	259	0	6	0	10.2	2.2
AVN	65	0	0	1.4	0.6	65	0	0	0	7.8	-0.3
AXF	99	4	43	1.3	0.0	95	2	42	0	8.4	1.9
AZA	631	1	10	2.3	0.1	644	0	11	0	9.6	0.9
BAL	512	0	12	1.8	-0.4	528	0	14	0	7.9	0.5
BAW	1871	1	12	2.1	-0.1	1886	0	12	0	8.0	0.8
BLX	52	2	6	2.0	-0.7	51	0	4	0	10.0	1.5
BWA	398	0	6	1.9	1.4	399	0	7	0	7.8	0.4
CAL	969	1	6	1.7	0.3	959	0	7	0	8.5	0.3
CCA	241	1	54	2.9	1.1	265	0	100	0	12.3	0.4
CDN	2884	0	8	1.9	0.4	2870	0	9	0	8.6	0.8
CES	330	1	5	1.6	0.4	332	1	53	0	9.6	0.2
CFC	48	0	17	1.8	0.4	47	0	23	0	9.3	-0.5
CFG	1081	0	6	2.0	-0.3	1079	0	6	0	8.1	0.4
CKS	456	0	39	1.3	0.7	454	0	40	0	7.5	0.8
CKT	249	2	6	2.1	1.5	236	0	5	0	7.4	0.5
CLX	448	1	6	1.8	-0.3	448	0	8	0	8.6	-0.1
CMI	460	0	7	1.9	0.4	453	0	5	0	8.6	1.4
CMM	761	0	8	1.7	0.1	754	0	8	0	6.8	0.9
COA	1528	1	22	1.5	0.2	1511	0	24	0	11.2	2.1
CPA	94	0	9	1.7	0.0	97	0	8	0	7.8	-0.4
CRL	580	1	8	1.6	0.4	581	0	8	0	6.4	1.1
CSN	70	0	21	2.3	0.5	67	1	22	0	11.5	-0.4
CTB	237	1	4	1.6	-0.2	244	0	5	0	5.9	0.9
CTM	37	3	24	2.3	-1.3	38	0	26	0	13.5	4.6
CUB	373	1	13	2.1	1.0	374	0	12	0	8.2	0.8
DAL	5222	0	30	1.6	0.2	5258	0	30	0	8.1	0.7
DBY	888	0	3	1.3	-0.3	904	0	5	0	7.3	0.8
DLH	3577	1	9	1.9	-0.1	3509	0	9	0	7.7	0.9
EEZ	54	0	13	1.8	-0.6	57	0	14	0	9.1	-0.7
EIA	280	3	30	1.5	0.7	273	0	30	0	7.9	2.0
ELY	144	1	6	1.7	-0.1	146	0	6	0	7.5	0.4
ETH	30	0	30	1.1	0.0	30	7	33	0	5.7	0.3
EVA	2176	0	4	1.6	-0.2	2193	0	5	0	8.2	0.1
EWW	97	1	13	1.5	0.3	97	0	14	0	10.5	2.1
FDX	1520	0	18	1.6	0.6	1509	0	19	0	8.0	1.0

	TEMPERATURE					WIND					
IDENT.	N.REP.	PG	PR	RMS	BIAS	N.REP.	PG	PR	PC	RMS	BIAS
FIN	683	1	12	2.1	0.5	669	0	12	0	9.0	0.5
FJI	1084	4	31	1.7	0.6	1061	0	30	0	8.5	0.5
FOM	237	3	37	1.7	-0.2	226	1	36	0	9.9	1.2
GAF	134	4	13	1.9	-0.7	135	1	14	0	7.1	0.7
GHA	75	3	7	1.2	0.4	77	0	6	0	10.0	2.5
GIA	73	4	23	2.2	1.2	72	1	19	0	6.6	-0.9
GRL	60	0	0	1.4	0.3	59	0	0	0	4.2	0.2
GTI	94	0	9	1.9	0.3	95	0	12	0	10.3	1.4
HAL	3341	0	35	1.4	0.4	3264	0	36	0	8.1	1.7
HLF	112	0	2	1.3	-0.3	110	0	5	0	7.7	0.8
HRH	139	4	57	2.2	0.8	138	0	56	0	7.5	0.2
IBE	3277	1	18	2.0	0.5	3261	0	18	0	8.3	0.8
ICE	1110	1	8	1.8	0.3	1099	0	9	0	8.5	1.1
IWD	230	1	4	1.4	-0.2	225	0	5	0	9.0	1.3
JAL	6696	0	4	1.8	0.3	6612	0	4	0	8.1	0.7
JKK	244	0	10	1.6	0.0	203	0	10	0	9.0	0.6
KAL	3711	0	10	2.0	-0.1	3664	0	10	0	9.1	0.7
KLM	3153	0	13	1.8	0.3	3162	0	14	0	7.4	0.8
KSV	23	0	22	1.5	0.5	23	0	22	0	5.1	0.3
LAN	33	0	21	3.8	0.3	33	3	15	0	15.9	3.7
LAP	49	2	10	2.2	0.5	49	2	14	0	13.0	1.7
LDA	113	1	13	1.9	-0.1	114	0	13	0	8.5	0.1
LDI	370	2	13	2.1	0.0	372	0	13	0	7.9	0.4
LGL	20	0	0	2.2	-0.9	20	0	5	0	6.0	1.3
LIB	381	1	3	1.8	1.2	389	0	4	0	8.5	1.3
LOT	533	1	15	2.3	-1.0	535	0	16	0	9.4	0.9
LPR	24	8	8	2.6	0.3	24	0	4	0	11.2	4.1
LTU	805	0	9	1.5	-0.2	813	0	10	0	7.6	0.9
MAH	21	0	10	1.3	-0.6	24	0	8	0	6.4	0.2
MAS	471	1	10	1.9	0.1	496	0	8	0	8.3	0.6
MDA	34	0	0	1.9	-0.4	34	0	3	0	10.1	-1.7
MON	198	2	7	1.8	-0.3	197	0	6	0	7.3	1.2
MPD	363	1	7	2.1	1.0	355	0	8	0	8.9	0.4
MPH	939	1	5	1.8	-0.5	945	0	5	0	7.5	0.6
NCA	633	0	1	1.6	0.0	634	0	3	0	7.9	0.6
NWA	11410	1	10	1.9	0.8	11121	0	10	0	8.1	0.6
OAE	170	0	41	1.1	0.3	172	0	42	0	6.7	1.1
OAL	24	0	21	3.1	2.0	24	0	21	0	11.6	2.5
PAC	190	1	21	1.7	0.8	192	0	22	0	7.6	0.2
PAL	979	0	3	1.5	-0.3	939	0	4	0	8.2	0.2
PAO	303	2	44	1.2	0.3	296	0	43	0	7.4	1.4
PAQ	26	0	12	3.3	-1.7	26	0	4	0	9.8	0.5
QFA	2120	1	49	2.1	0.1	2085	0	49	0	8.1	0.5
RAF	66	0	5	2.5	1.4	66	0	5	0	7.5	1.2
RAM	86	0	5	1.7	-0.1	86	0	7	0	9.0	1.3
RCH	460	1	21	2.3	0.9	449	0	56	0	11.4	1.9
RJA	37	5	22	2.5	0.2	39	0	18	0	9.6	3.0
RKA	96	0	2	1.3	-0.3	96	0	3	0	7.9	1.1
ROY	261	2	15	2.1	-0.3	266	0	16	0	10.4	0.7
RRR	66	3	20	2.3	-0.9	65	0	18	0	13.7	1.4
RYN	607	0	42	1.4	0.8	599	0	42	0	5.8	0.9
RZO	114	2	6	2.2	0.3	112	0	1	0	6.9	1.5
SAA	242	0	3	1.5	0.2	237	0	3	0	6.0	0.5
SAS	1808	0	2	1.8	-0.3	1794	0	3	0	7.8	0.6
SEU	47	4	6	2.5	1.9	47	0	2	0	6.6	1.0
SIA	999	0	7	1.8	-0.2	1004	0	8	0	8.2	-0.1
SLR	170	1	37	4.6	2.2	172	0	12	0	7.3	-0.5
SOL	58	3	9	1.5	1.0	58	2	9	0	7.6	1.4
SSV	30	0	10	2.2	0.2	29	0	3	0	4.0	0.7

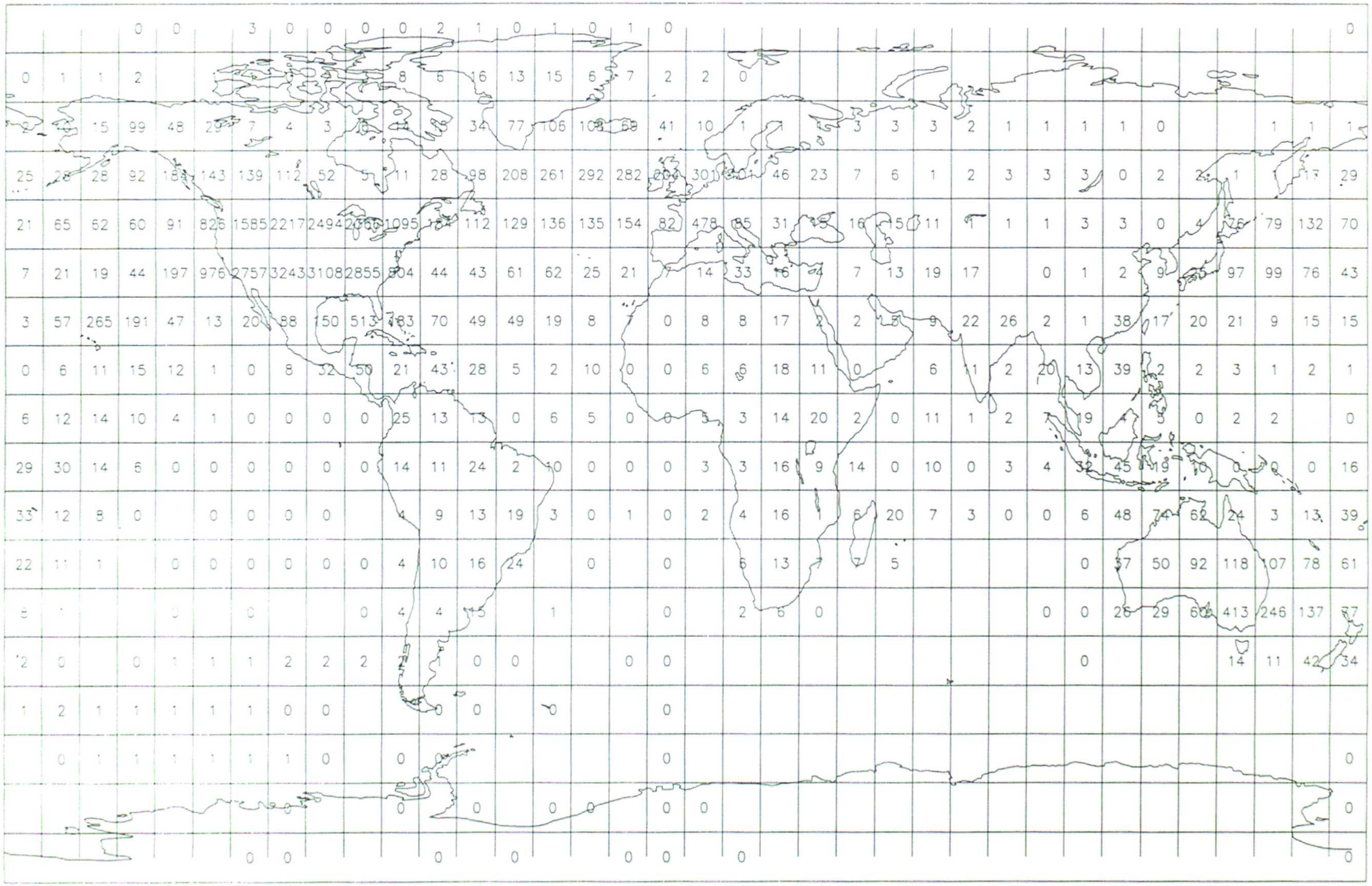
IDENT.	TEMPERATURE					WIND					
	N.REP.	PG	PR	RMS	BIAS	N.REP.	PG	PR	PC	RMS	BIAS
SVA	168	1	7	1.9	-0.6	176	0	6	0	7.2	0.8
SVV	24	0	33	5.4	4.8	24	0	0	0	11.0	5.2
SWR	84	0	10	2.2	0.9	87	0	13	0	7.9	0.6
TAM	24	4	38	3.2	1.6	24	0	42	0	14.1	5.0
TAP	757	2	8	1.5	-0.2	757	0	9	0	8.4	1.1
TBA	39	0	15	2.2	1.4	38	0	18	0	11.9	2.3
THA	512	1	6	1.7	-0.2	509	1	7	0	8.7	0.1
THT	70	0	17	2.3	1.1	70	0	16	0	7.7	1.6
TOW	156	1	21	2.0	0.8	155	0	19	0	8.3	1.1
TSC	187	3	17	2.2	0.7	189	0	15	0	10.0	1.0
TWA	1658	1	17	1.6	0.1	1586	0	17	0	8.9	1.1
UAL	100718	0	86	1.4	0.1	100639	0	86	0	6.4	0.8
UPS	1578	0	32	1.7	0.3	1583	0	33	0	8.0	0.9
USA	281	1	5	1.7	-0.1	255	0	5	0	8.6	1.9
VIR	534	1	7	1.9	-0.1	531	0	8	0	8.1	1.0
VKG	48	2	15	2.0	0.3	49	0	14	0	8.1	2.2
VPB	30	3	13	3.1	0.5	29	0	10	0	9.5	0.4
VRG	300	3	20	2.2	0.8	299	0	100	0	11.2	0.8
VSP	42	0	17	2.1	1.4	42	0	21	0	12.2	1.7
VVR	43	7	40	3.8	2.6	43	0	33	0	8.1	2.8
WOA	145	0	14	2.2	0.8	154	0	13	0	9.3	0.2
ZKN	2663	1	14	1.9	-0.4	2663	0	14	0	10.6	0.4
AN	22881	0	1	1.6	0.3	22881	0	1	0	6.1	0.6
AR	3610	0	100	3.0	2.7	3599	0	1	0	6.8	0.6
BA	32790	0	1	1.5	0.3	32716	0	1	0	6.0	0.8
IT	1118	0	68	1.1	0.2	1106	0	68	0	6.7	0.1
KL	9377	0	10	1.6	1.0	9356	0	10	0	6.0	0.7
LH	207	0	1	2.1	1.4	268	0	4	0	7.6	0.0
MK	5739	0	50	2.1	1.7	5728	0	0	0	7.1	0.0
NZ	73	0	0	0.8	-0.1	73	0	0	0	4.1	0.6
OZ	34	0	47	2.2	0.4	34	0	50	0	13.2	2.1
QF	26081	0	4	1.5	0.5	26084	0	4	0	6.1	0.8
QG	626	0	2	1.8	0.5	626	0	1	0	6.2	0.7
SA	3586	0	18	2.4	1.9	3582	0	0	0	7.0	1.0
SK	22	0	0	1.2	-0.3	22	0	0	0	5.0	-0.3
SV	105	100	100	46.3	-32.8	102	0	100	0	21.7	15.1
UA	749	2	18	1.8	0.2	815	0	17	0	8.5	1.2
WA	300	9	18	1.6	0.7	294	5	100	0	10.5	-0.4
XX	3419	2	8	1.5	0.5	4128	0	100	0	11.2	1.7
N	725	1	15	2.5	0.7	749	0	14	0	7.8	0.9
US ACARS	556687	0	13	1.3	0.4	556620	0	14	0	6.4	0.9

MEAN DAILY COUNT OF AIRCRAFT 70 – 500 HPA

FIGURE 3

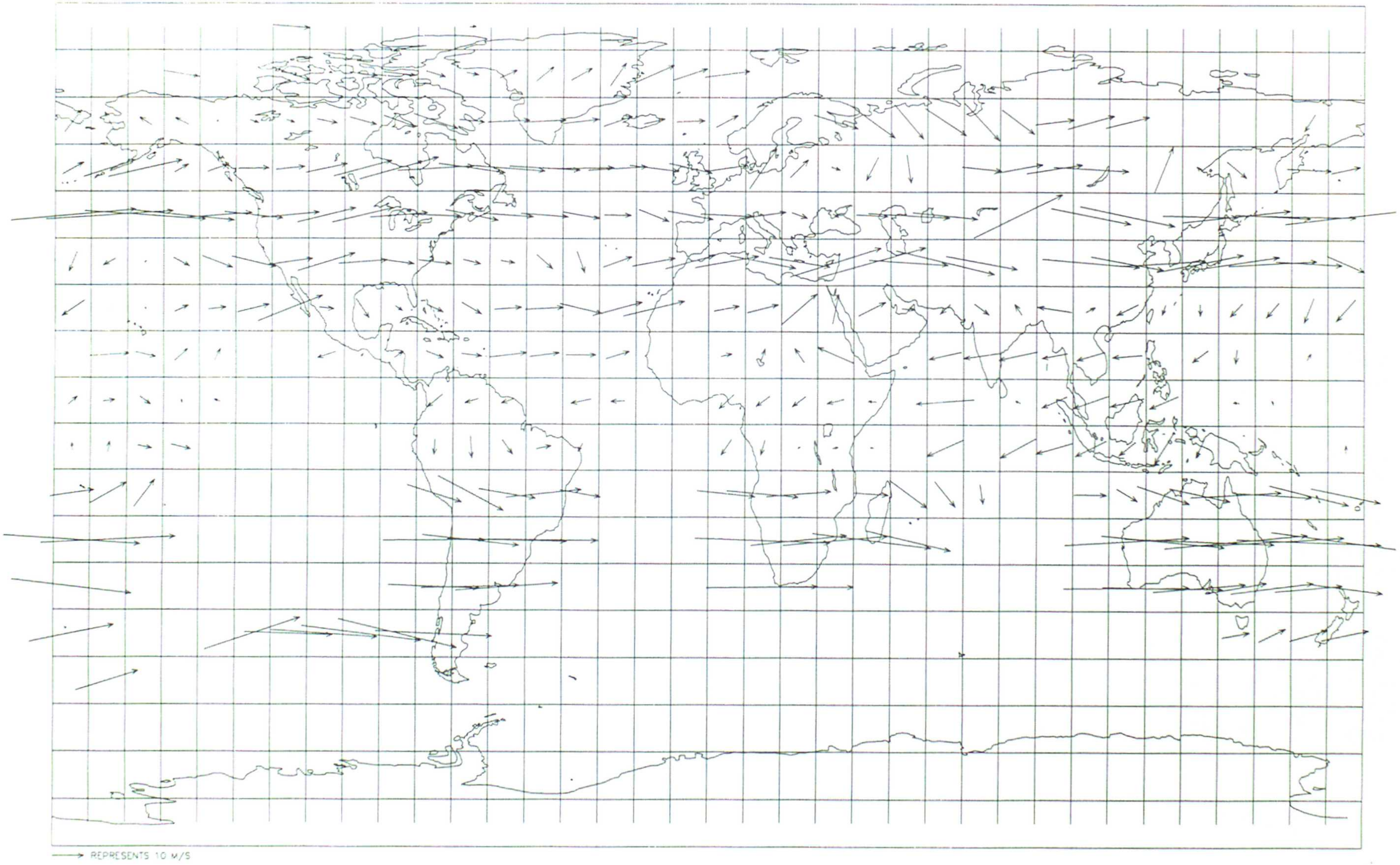
JUNE 1999

OBSERVATIONS WITH O–B VECTOR DIFFERENCE GREATER THAN 60 MPS EXCLUDED

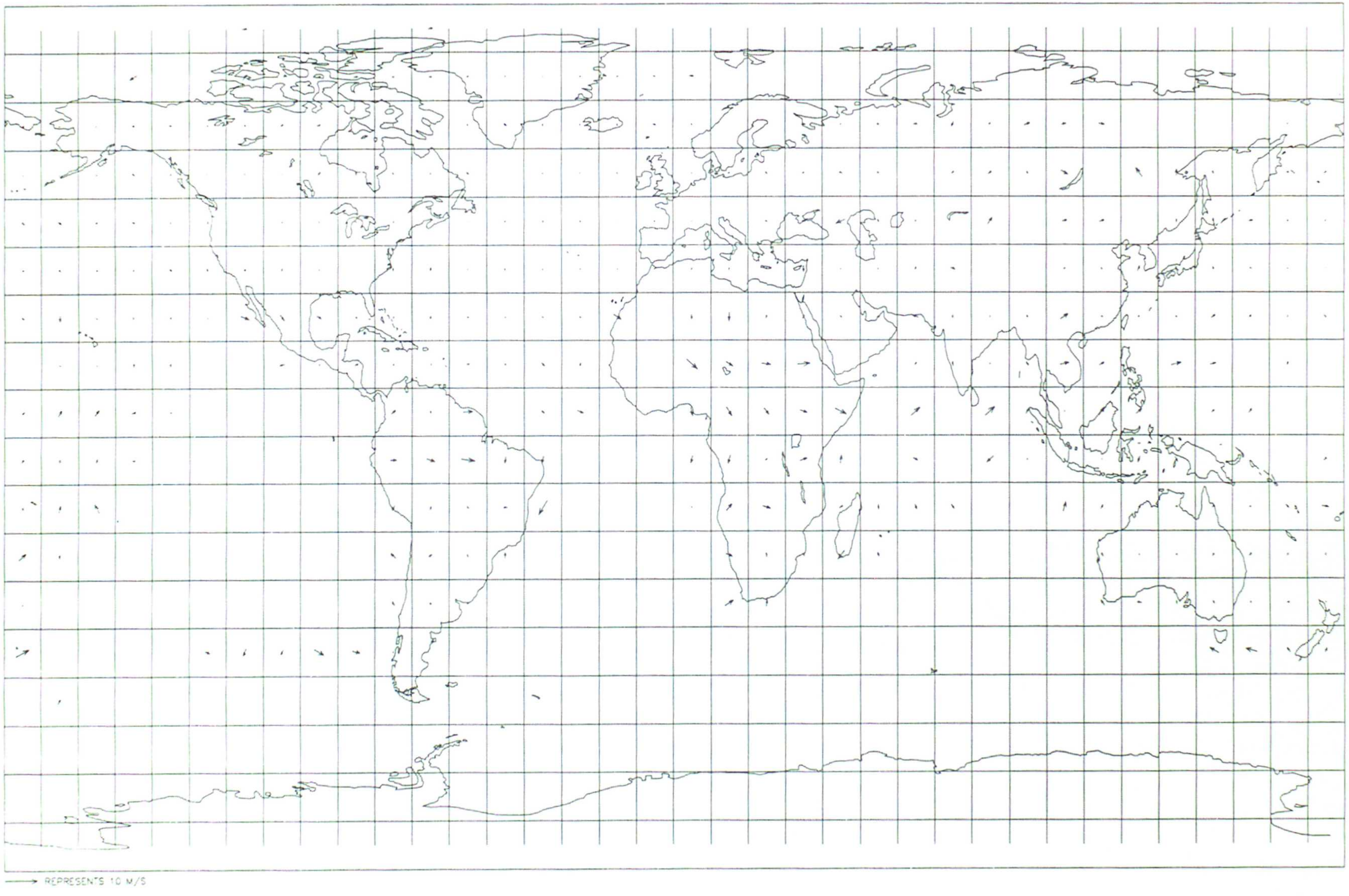

0 0 3 0 0 0 0 2 1 0 1 0 1 0 0
0 1 1 2 8 6 16 13 15 6 7 2 2 0
2 10 15 99 48 29 7 4 3 10 14 13 34 77 106 108 69 41 10 1 1 3 3 3 2 1 1 1 1 0 1 1 1
25 28 28 92 184 143 139 112 52 5 11 28 98 208 261 292 282 204 301 401 46 23 7 6 1 2 3 3 3 0 2 2 1 1 17 29
21 65 62 60 91 826 1585 2217 2494 2360 1095 184 112 129 136 135 154 82 478 85 31 15 16 15 11 1 1 1 3 3 0 4 76 79 132 70
7 21 19 44 197 976 2757 3243 3108 2855 804 44 43 61 62 25 21 7 14 33 16 4 7 13 19 17 0 1 2 9 25 97 99 76 43
3 57 265 191 47 13 20 88 150 513 183 70 49 49 19 8 7 0 8 8 17 2 2 5 9 22 26 2 1 38 17 20 21 9 15 15
0 6 11 15 12 1 0 8 32 50 21 43 28 5 2 10 0 0 6 6 18 11 0 6 11 2 20 13 39 2 2 3 1 2 1
6 12 14 10 4 1 0 0 0 0 25 13 13 0 6 5 0 0 5 3 14 20 2 0 11 1 2 7 19 4 5 0 2 2 0
29 30 14 6 0 0 0 0 0 0 14 11 24 2 10 0 0 0 3 3 16 9 14 0 10 0 3 4 32 45 19 10 0 0 0 16
33 12 8 0 0 0 0 0 4 9 13 19 3 0 1 0 2 4 16 1 6 20 7 3 0 0 6 48 74 62 24 3 13 39
22 11 1 0 0 0 0 0 0 4 10 16 24 0 0 6 13 7 7 5 0 37 50 92 118 107 78 61
8 1 0 0 0 4 4 15 1 0 2 6 0 0 0 26 29 60 413 246 137 37
2 0 0 1 1 1 2 2 2 2 1 0 0 0 0 0 14 11 42 34
1 2 1 1 1 1 1 0 0 0 0 0 0
0 1 1 1 1 1 1 0 0 0 0
0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0

AIRCRAFT MEAN WINDS BETWEEN 70 AND 500 HPA
JUNE 1999
OBSERVATIONS WITH O–B VECTOR DIFFERENCE GREATER THAN 60 MPS EXCLUDED
VALUES ARE PRINTED WHERE MORE THAN 30 OBS ARE PRESENT

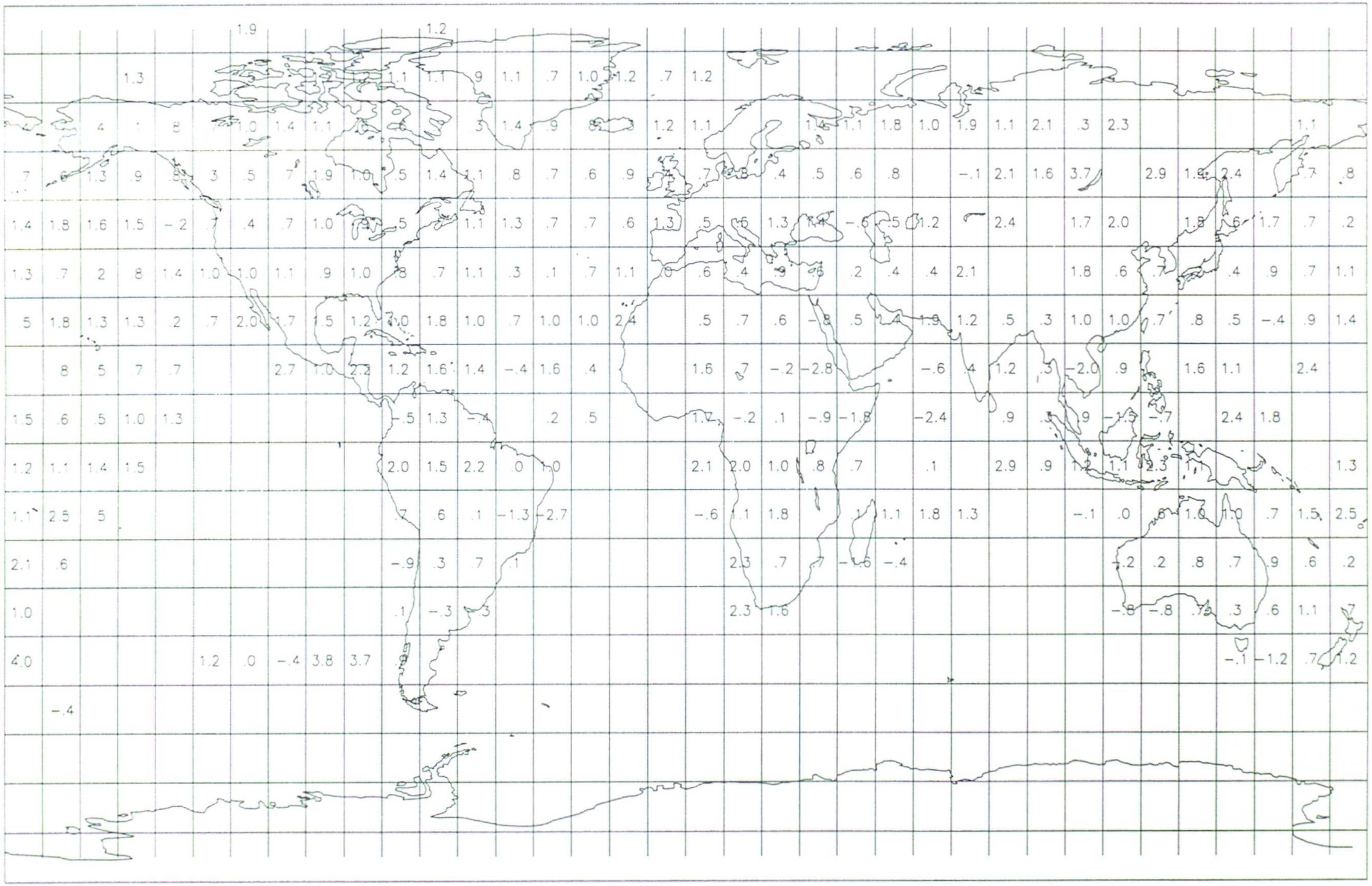
FIGURE 4



AIRCRAFT MEAN O–B WINDS BETWEEN 70 AND 500 HPA FIGURE 5
JUNE 1999
OBSERVATIONS WITH O–B VECTOR DIFFERENCE GREATER THAN 60 MPS EXCLUDED
VALUES ARE PRINTED WHERE MORE THAN 30 OBS ARE PRESENT



AIRCRAFT : MEAN O-B SPEEDS (M/S) BETWEEN 70 AND 500 HPA FIGURE 6
JUNE 1999
OBSERVATIONS WITH O-B VECTOR DIFFERENCE > 60 MPS EXCLUDED
VALUES ARE PRINTED WHERE > 30 OBS ARE PRESENT


1.9 1.2
1.3 1.1 1.1 .9 1.1 .7 1.0 1.2 .7 1.2
4 .1 .8 .7 1.0 1.4 1.1 .6 .6 .3 1.4 .9 .8 .3 1.2 1.1 1.4 1.1 1.8 1.0 1.9 1.1 2.1 .3 2.3 1.1
.7 .6 1.3 .9 .8 .3 .5 .7 1.9 1.0 .5 1.4 1.1 .8 .7 .6 .9 .7 .8 .4 .5 .6 .8 −.1 2.1 1.6 3.7 2.9 1.9 2.4 .7 .8
1.4 1.8 1.6 1.5 −.2 .7 .4 .7 1.0 .9 .5 1.1 1.3 .7 .7 .6 1.3 .5 .6 1.3 1.4 −.6 −.5 1.2 2.4 1.7 2.0 1.8 .6 1.7 .7 .2
1.3 .7 .2 .8 1.4 1.0 1.0 1.1 .9 1.0 .8 .7 1.1 .3 .1 .7 1.1 .0 .6 .4 .9 .6 .2 .4 .4 2.1 1.8 .6 .7 .4 .9 .7 1.1
.5 1.8 1.3 1.3 .2 .7 2.0 1.7 1.5 1.2 1.0 1.8 1.0 .7 1.0 1.0 2.4 .5 .7 .6 −.8 .5 .4 1.9 1.2 .5 .3 1.0 1.0 .7 .8 .5 −.4 .9 1.4
.8 .5 .7 .7 2.7 1.0 2.2 1.2 1.6 1.4 −.4 1.6 .4 1.6 .7 −.2 −2.8 −.6 .4 1.2 .3 −2.0 .9 1.6 1.1 2.4
1.5 .6 .5 1.0 1.3 −.5 1.3 −.4 .2 .5 1.7 −.2 .1 −.9 −1.8 −2.4 .9 .3 .9 −1.5 −.7 2.4 1.8
1.2 1.1 1.4 1.5 2.0 1.5 2.2 .0 1.0 2.1 2.0 1.0 .8 .7 .1 2.9 .9 1.2 1.1 2.3 1.1 1.3
1.1 2.5 .5 .7 .6 .1 −1.3 −2.7 −.6 1.1 1.8 .1 1.1 1.8 1.3 −.1 .0 .6 1.0 1.0 .7 1.5 2.5
2.1 .6 −.9 .3 .7 .1 2.3 .7 .7 −1.6 −.4 −.2 .2 .8 .7 .9 .6 .2
1.0 .1 −.3 .3 2.3 1.6 −.8 −.8 .7 .3 .6 1.1 .7
4.0 1.2 .0 −.4 3.8 3.7 −.1 −1.2 .7 1.2
−.4

AIRCRAFT : RMS O-B VECTOR (M/S) BETWEEN 70 AND 500 HPA FIGURE 7
JUNE 1999
OBSERVATIONS WITH O-B VECTOR DIFFERENCE GREATER THAN 60 MPS EXCLUDED
VALUES ARE PRINTED WHERE > 30 OBS ARE PRESENT

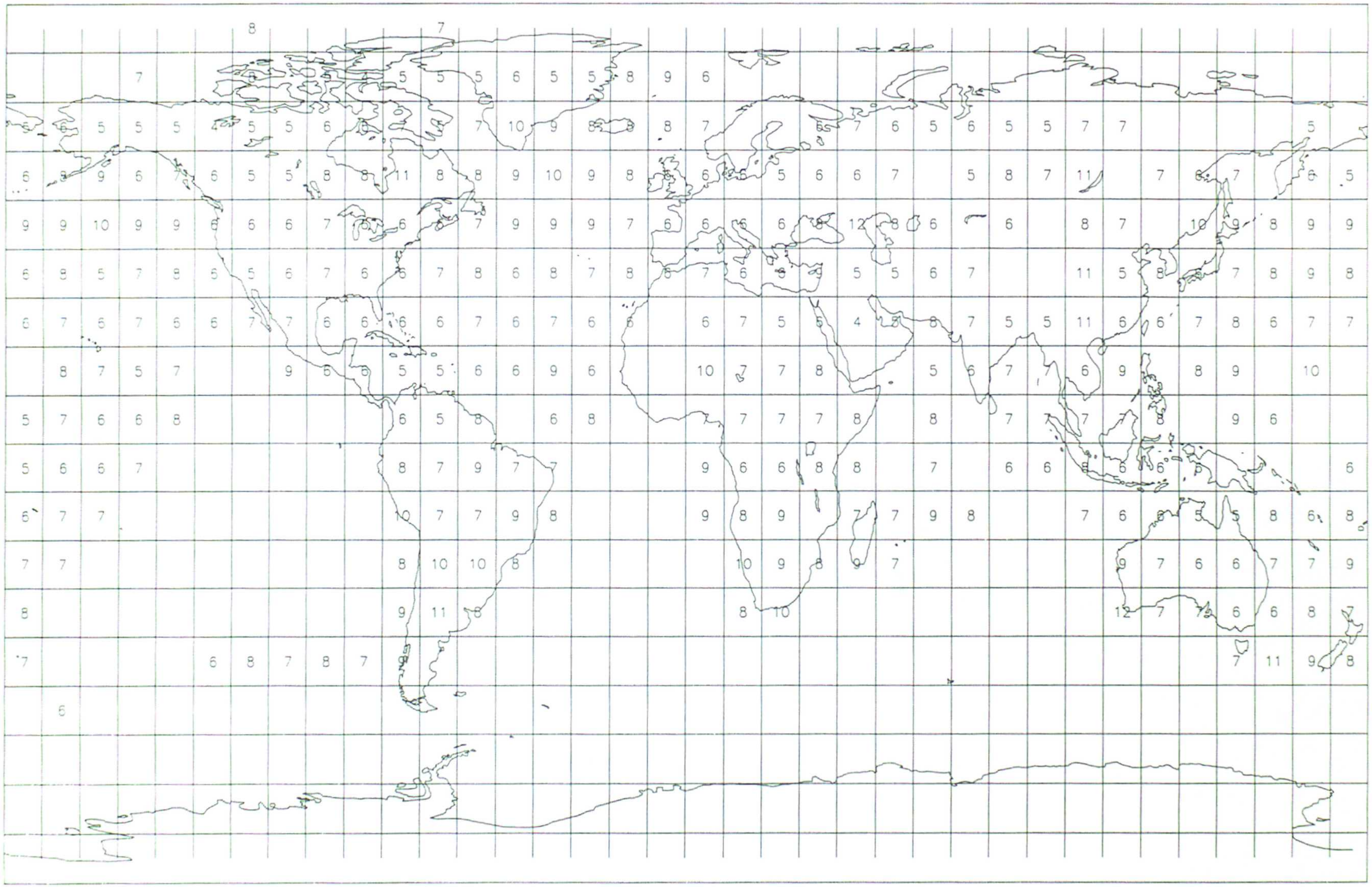


TABLE 5

MONTHLY MONITORING OF RADIOSONDE OBSERVATIONS
MONITORING CENTRE: BRACKNELL
MONTH: June 1999

Monitoring procedures

Period		:One calendar month.
Data monitored		:Reports from each unique identifier for radiosonde TEMPs.
Area monitored		:90°N - 90°S, 180°W - 180°E.
Standard of comparison		:Background field from UKMO global model.
Observation times		:00 UTC and 12 UTC.
Level(s) monitored		:Standard levels between 1000.0 - 30.0 hPa
Element monitored		:GEOPOTENTIAL HEIGHT IN metres
Parameters monitored	:NUM OBS	:Number of observations available at level shown during period.
	:NUM GROSS	:Number of gross errors at level shown duringperiod.
	:% REJ	:Percentage of observations rejected by quality control at level shown during period excluding those with gross errors.
	:SD	:SD of difference of observations from background values at level shown excluding those with gross errors.
	:BIAS	:Mean difference of observations from background values at level shown excluding those with gross errors.
	:RMS	:Root Mean Square difference of observations from background values at level shown excluding those with gross errors.
	:NUM LEVELS	:Number of levels satisfying selection criteria.
GROSS ERROR LIMITS	:Defined in Appendix I.1	
SELECTION CRITERIA	: ≥3 levels with ≥10 observations and ≥ 100 m weighted RMS.	

ONLY THE WORST LEVEL IS SHOWN WITH UNWEIGHTED RMS

WMO IDENT	OBS TIME	ELM	LEV	LAT/LONG	NUM OBS	NUM GROSS	SD	BIAS	RMS	NUM LEVELS
42027	12	Z	1000	34/ 75	22	1	23.3	-44.0	49.8	6
42101	00	Z	200	30/ 76	21	0	97.6	51.3	110.3	6
42182	12	Z	150	29/ 77	24	1	31.9	137.8	141.5	5
42339	00	Z	200	26/ 73	10	0	55.3	102.0	116.0	4
42339	12	Z	200	26/ 73	11	1	97.8	94.2	135.8	5
42361	00	Z	150	26/ 78	14	0	67.2	92.1	114.0	4
42361	12	Z	150	26/ 78	16	0	105.5	75.6	129.8	5
42369	12	Z	150	27/ 81	17	1	92.2	121.6	152.6	6
42397	12	Z	250	27/ 88	22	0	78.5	-51.4	93.8	7
42647	12	Z	100	23/ 73	13	2	56.5	185.5	193.9	7
42667	12	Z	150	23/ 77	14	0	66.8	96.9	117.7	4
42809	12	Z	100	23/ 88	25	0	88.5	98.6	132.5	4
42971	00	Z	150	20/ 86	19	0	103.5	89.4	136.7	5
42971	12	Z	200	20/ 86	22	0	75.1	51.3	90.9	4
43003	00	Z	100	19/ 73	15	1	121.7	126.7	175.7	4
43003	12	Z	150	19/ 73	17	5	104.3	138.9	173.7	7
43041	12	Z	100	19/ 82	14	0	62.3	106.1	123.0	4
43128	12	Z	150	17/ 78	26	0	63.1	143.0	156.3	6
43185	12	Z	200	16/ 81	23	0	88.0	27.1	92.1	6
43192	00	Z	100	15/ 74	9	1	87.8	-89.7	125.5	6
43295	00	Z	100	13/ 78	20	1	65.4	118.9	135.8	4
43295	12	Z	100	13/ 78	16	0	89.2	122.4	151.5	5
43346	12	Z	100	11/ 80	26	0	81.5	79.7	114.0	4
43369	00	Z	100	8/ 73	17	1	70.0	-111.5	131.7	6
43371	12	Z	100	8/ 77	25	1	84.7	112.0	140.4	5
53463	00	Z	100	41/ 112	21	0	41.0	113.3	120.5	5
53614	12	Z	100	38/ 106	29	0	35.0	118.2	123.3	4
53772	00	Z	150	38/ 113	26	0	34.1	89.2	95.5	4
53915	00	Z	1000	36/ 107	25	0	13.0	54.8	56.3	4
68240	12	Z	850	-24/ 26	16	0	23.1	40.5	46.6	4
89009	00	Z	850	-90/ 0	1	24	0.0	82.0	82.0	5
89642	00	Z	1000	-67/ 140	24	0	34.2	4.5	34.4	5
89664	00	Z	500	-78/ 167	22	0	32.6	66.8	74.3	7

AVAILABILITY – TEMP – 500 HPA GEOPOTENTIAL – JUNE 1999 FIGURE 8
ALL HOURS
10 DEGREE BOX AVERAGE NUMBER OF OBSERVATIONS IN 24 HOURS
GLOBAL AVERAGE NUMBER OF OBSERVATIONS IN 24 HOURS – 1057

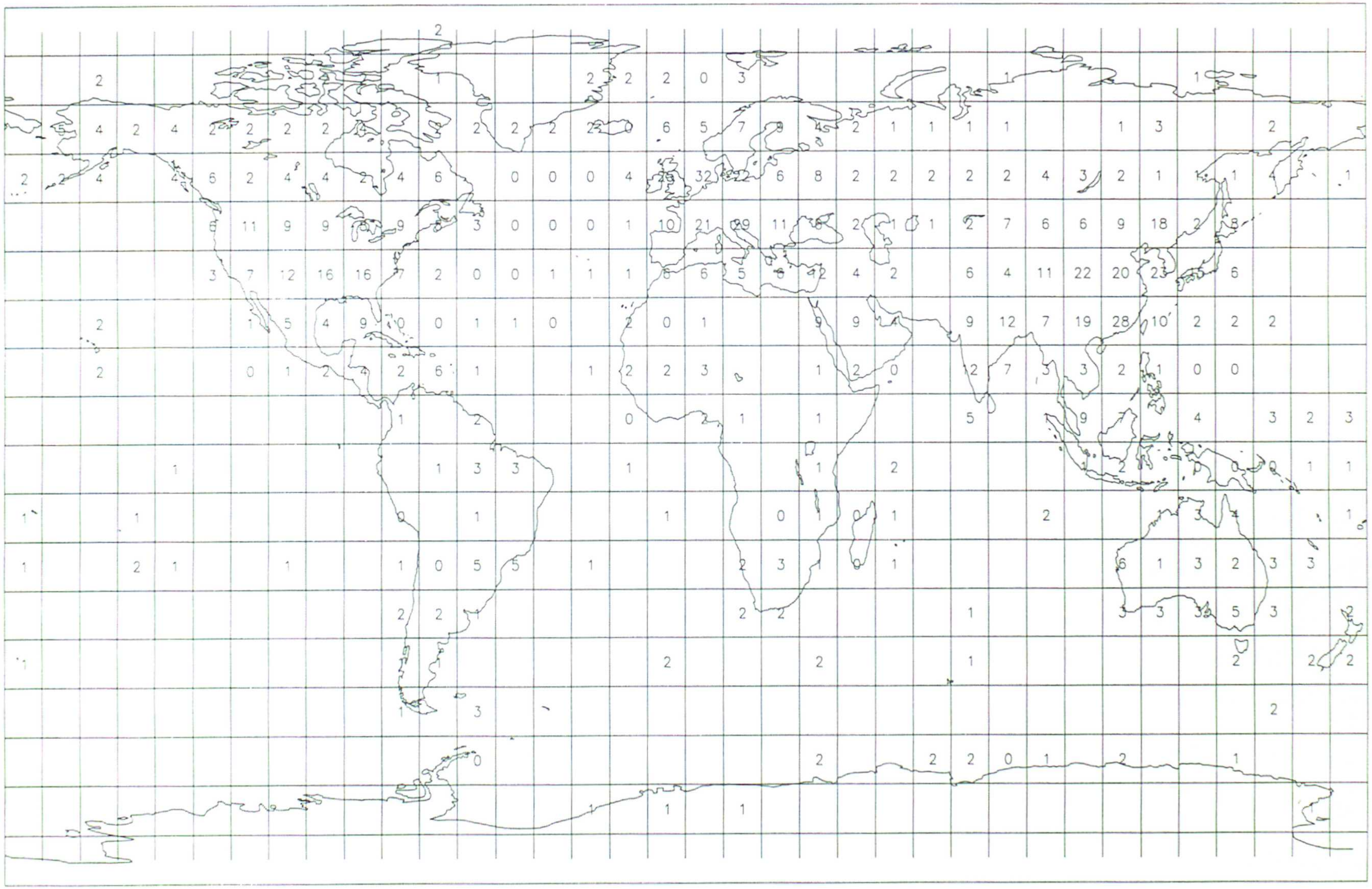


TABLE 6

MONTHLY MONITORING OF RADIOSONDE OBSERVATIONS
MONITORING CENTRE: BRACKNELL
MONTH: June 1999

Monitoring procedures

Period		:One calendar month.
Data monitored		:Reports from each unique identifier for radiosonde TEMPs.
Area monitored		:90°N - 90°S, 180°W - 180°E.
Standard of comparison		:Background field from UKMO global model.
Observation times		:00 UTC and 12 UTC.
Level(s) monitored		:Standard levels between 1000.0 - 100.0 hPa
Element monitored		:VECTOR WIND in m s^{-1}
Parameters monitored		
	:NUM OBS	:Number of observations available at level shown during period.
	:NUM GROSS	:Number of gross errors at level shown during period.
	:% REJ	:Percentage of observations rejected by quality control at level shown during period excluding those with gross errors.
	:UBIAS,VBIAS	:Mean difference of observations of U and V components from background values at level shown excluding those with gross errors.
	:RMS	:Root Mean Square difference of observations from background values at level shown excluding those with gross errors.
	:NUM LEVELS	:Number of levels satisfying selection criteria.
GROSS ERROR LIMITS	:Defined in Appendix I.2	
SELECTION CRITERIA	: $\geq$ 10 observations and $>$ 15 m s^{-1} RMS vector wind.	

ONLY THE STANDARD LEVEL BETWEEN 1000 - 100 hPa WITH HIGHEST RMS IS SHOWN

WMO IDENT	OBS TIME	ELM	LEV	LAT/LONG	NUM OBS	NUM GROSS	% REJ	UBIAS	VBIAS	RMS	LEVELS
43369	12	V	100	8/ 73	15	0	100	4.4	1.1	16.4	1
48455	12	V	100	14/ 101	17	0	0	16.8	5.7	17.2	1
83612	00	V	250	-20/ -55	24	0	12	6.5	-5.4	15.9	1
83612	12	V	250	-20/ -55	24	0	16	1.2	-1.6	18.4	4

AVAILABILITY – TEMP/PILOT – 300 HPA WIND – JUNE 1999 FIGURE 9

ALL HOURS

10 DEGREE BOX AVERAGE NUMBER OF OBSERVATIONS IN 24 HOURS

GLOBAL AVERAGE NUMBER OF OBSERVATIONS IN 24 HOURS – 1158

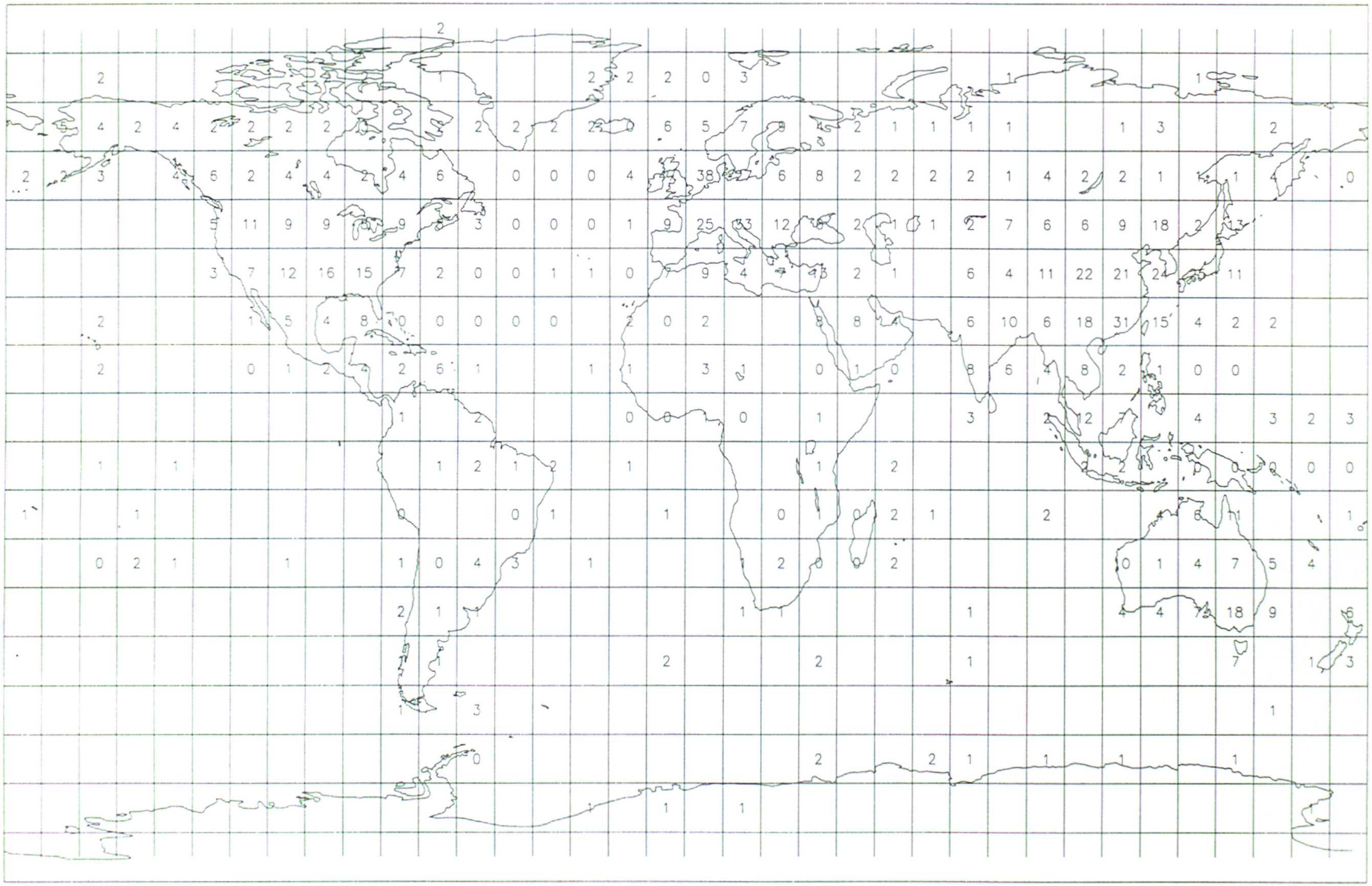

2
2 1 2 2 2 0 3 1 1
5 4 2 4 2 2 2 2 2 2 2 2 2 0 6 5 7 9 4 2 1 1 1 1 1 3 2
2 2 3 4 6 2 4 4 2 4 6 0 0 0 4 4 38 2 6 8 2 2 2 2 1 4 2 2 1 1 1 4 0
5 11 9 9 15 9 3 0 0 0 1 9 25 33 12 16 2 1 1 2 7 6 6 9 18 2 13
3 7 12 16 15 7 2 0 0 1 1 0 7 9 4 7 43 2 1 6 4 11 22 21 24 25 11
2 1 5 4 8 0 0 0 0 0 2 0 2 8 8 4 6 10 6 18 31 15 4 2 2
2 0 1 2 4 2 6 1 1 1 3 1 0 1 0 8 6 4 8 2 1 0 0
1 2 0 0 1 0 1 3 2 12 7 4 3 2 3
1 1 1 2 1 2 1 1 2 2 2 0 0 0 0 0
1 1 0 0 1 1 0 1 0 2 1 2 4 6 1 1 1
0 2 1 1 1 0 4 3 1 1 2 0 0 2 0 1 4 7 5 4
2 1 1 1 1 1 4 4 7 3 18 9 6
1 2 2 1 7 1 3
1 3 1
0 2 2 1 1 1 1
1 1 1 1

TABLE 7

MONTHLY MONITORING OF RADIOSONDE OBSERVATIONS
MONITORING CENTRE: BRACKNELL
MONTH: June 1999

Monitoring procedures

Period :One calendar month.

Data monitored :Reports from each unique identifier for radiosonde TEMPs.

Area monitored :90°N - 90°S, 180°W - 180°E.

Standard of comparison :Background field from UKMO global model.

Observation times :00 UTC and 12 UTC.

Level(s) monitored :Standard levels between 500.0 - 150.0 hPa

Element monitored :WIND DIRECTION in degrees

Parameters monitored

:NUM OBS :Average number of observations at all levels.

:BIAS :Mean difference of observations from background values from all levels.

:MAX SPREAD :(For observation - background values) Maximum absolute difference of SD at any level from SD at all levels

:SD :SD of difference of observations from background values at all levels.

SELECTION CRITERIA :NUM OBS $\geq$ 5, and
ABSOLUTE BIAS $\geq$ 10°, with
SD < 30°, and
MAX SPREAD < 10°

WMO IDENT	OBS TIME	ELM	LAT/LONG	NUM OBS	BIAS	MAX SPREAD	SD
17240	00	DD	38/ 31	21	-12.2	3.7	14.8
17240	12	DD	38/ 31	24	-10.5	2.2	13.4
17280	00	DD	38/ 40	24	-12.9	3.6	10.3
17280	12	DD	38/ 40	27	-13.8	3.3	11.0
40375	12	DD	28/ 37	28	-20.2	8.8	24.2
42397	12	DD	27/ 88	6	14.8	6.2	17.8
50557	00	DD	49/ 125	23	-14.1	9.7	18.6
59134	12	DD	24/ 118	16	11.9	6.6	24.4
59280	12	DD	24/ 113	16	11.4	9.0	25.3
62337	00	DD	31/ 34	24	-21.2	3.7	7.5
62337	12	DD	31/ 34	28	-21.9	2.8	9.0
72210	00	DD	28/ -82	15	-13.6	8.9	26.9
89532	12	DD	-69/ 40	22	12.5	5.5	23.2
89592	00	DD	-67/ 93	16	11.1	9.2	25.2
96441	12	DD	3/ 113	17	10.4	9.6	22.9

MONITORING OF SATELLITE WINDS

MONITORING CENTRE: BRACKNELL

MONTH: June 1999

Monitoring procedures

Period :One calendar month.

Data monitored :Reports from GOES, METEOSAT, GMS, INSAT.

Standard of comparison :Background field from UKMO global model.

Selection Criteria :number of observations > 10.

Data Extracted :Layer 701 - 1000 hPa
401 - 700 hPa
101 - 400 hPa

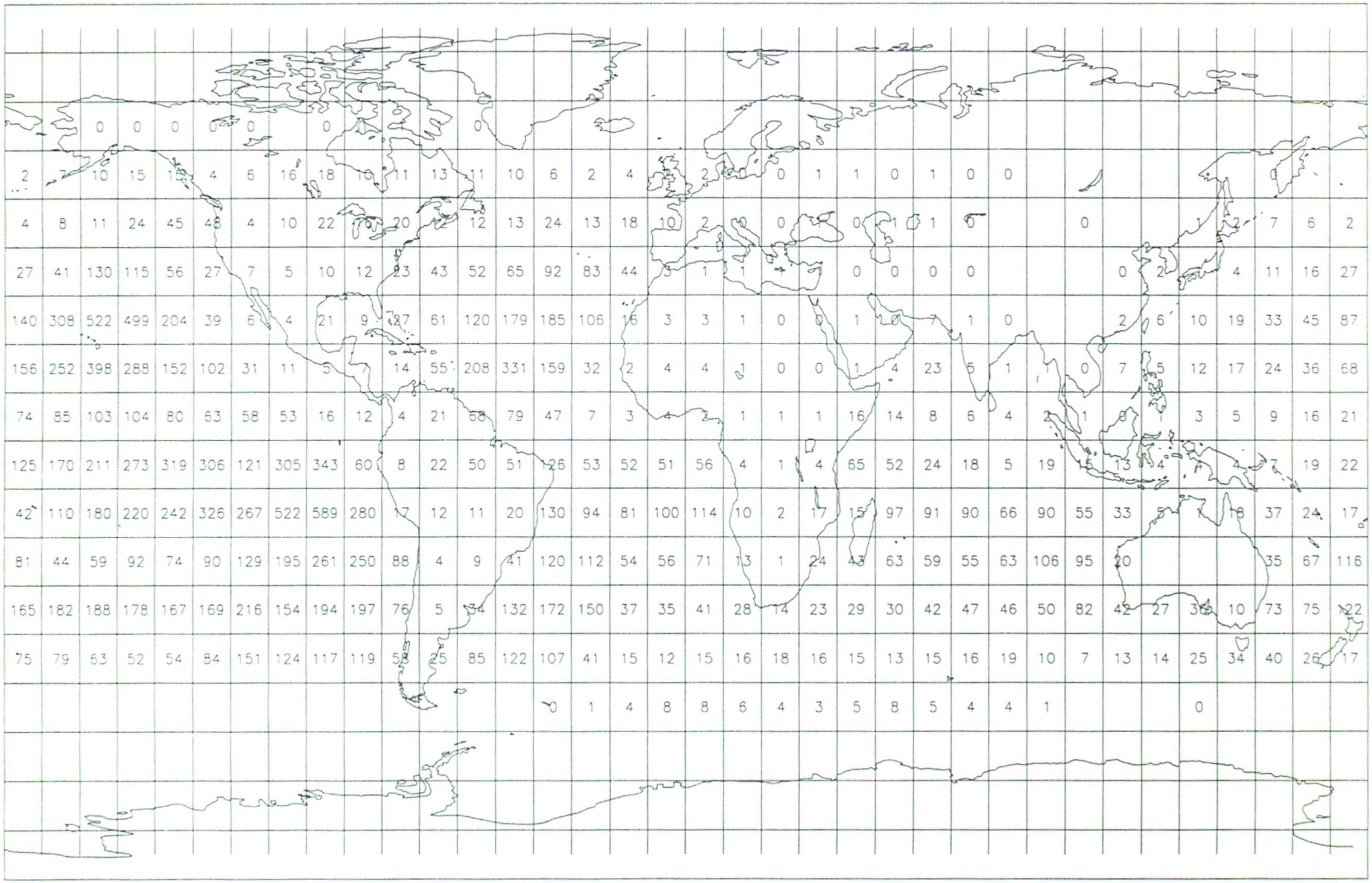
:Mean wind

:Mean observation minus background vector wind differences

:Mean observation minus background speed differences

:RMS of observation minus background vector differences

AVERAGE DAILY NUMBER OF SATOB OBSERVATIONS BETWEEN 701 AND 1000 HPA FIGURE 10
JUNE 1999


0 0 0 0 0 0 0
2 7 10 15 15 4 6 16 18 10 11 13 11 10 6 2 4 2 0 0 1 1 0 1 0 0 0
4 8 11 24 45 48 4 10 22 10 20 12 12 13 24 13 18 10 2 0 0 1 0 1 1 0 0 1 2 7 6 2
27 41 130 115 56 27 7 5 10 12 23 43 52 65 92 83 44 3 1 1 1 1 0 0 0 0 0 2 4 11 16 27
140 308 522 499 204 39 6 4 21 9 27 61 120 179 185 106 16 3 3 1 0 0 1 0 7 1 0 2 6 10 19 33 45 87
156 252 398 288 152 102 31 11 5 7 14 55 208 331 159 32 2 4 4 1 0 0 1 4 23 5 1 1 0 7 5 12 17 24 36 68
74 85 103 104 80 63 58 53 16 12 4 21 58 79 47 7 3 4 2 1 1 1 16 14 8 6 4 2 1 0 1 3 5 9 16 21
125 170 211 273 319 306 121 305 343 60 8 22 50 51 126 53 52 51 56 4 1 4 65 52 24 18 5 19 15 13 4 4 4 7 19 22
42 110 180 220 242 326 267 522 589 280 17 12 11 20 130 94 81 100 114 10 2 17 15 97 91 90 66 90 55 33 5 1 18 37 24 17
81 44 59 92 74 90 129 195 261 250 88 4 9 41 120 112 54 56 71 13 1 24 43 63 59 55 63 106 95 20 35 67 116
165 182 188 178 167 169 216 154 194 197 76 5 34 132 172 150 37 35 41 28 14 23 29 30 42 47 46 50 82 42 27 36 10 73 75 122
75 79 63 52 54 84 151 124 117 119 58 25 85 122 107 41 15 12 15 16 18 16 15 13 15 16 19 10 7 13 14 25 34 40 26 17
0 1 4 8 8 6 4 3 5 8 5 4 4 1 0

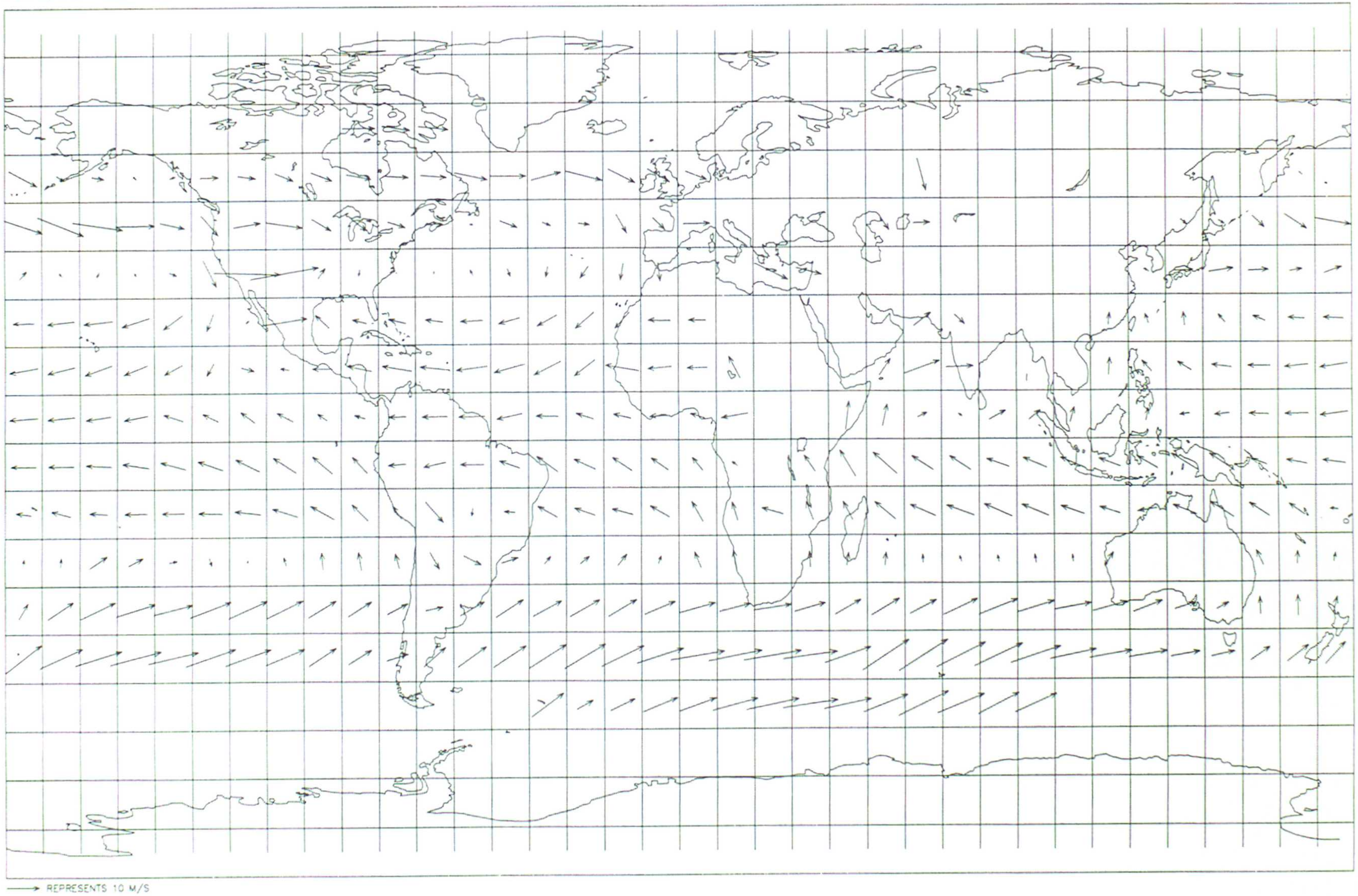
SATOB METEOSAT W/V VECTOR MEAN WINDS BETWEEN 701–1000 HPA

FIGURE 11

JUNE 1999

ALL OBSERVATIONS

ARROWS PLOTTED WHERE MORE THAN 10 OBS ARE PRESENT


REPRESENTS 10 M/S

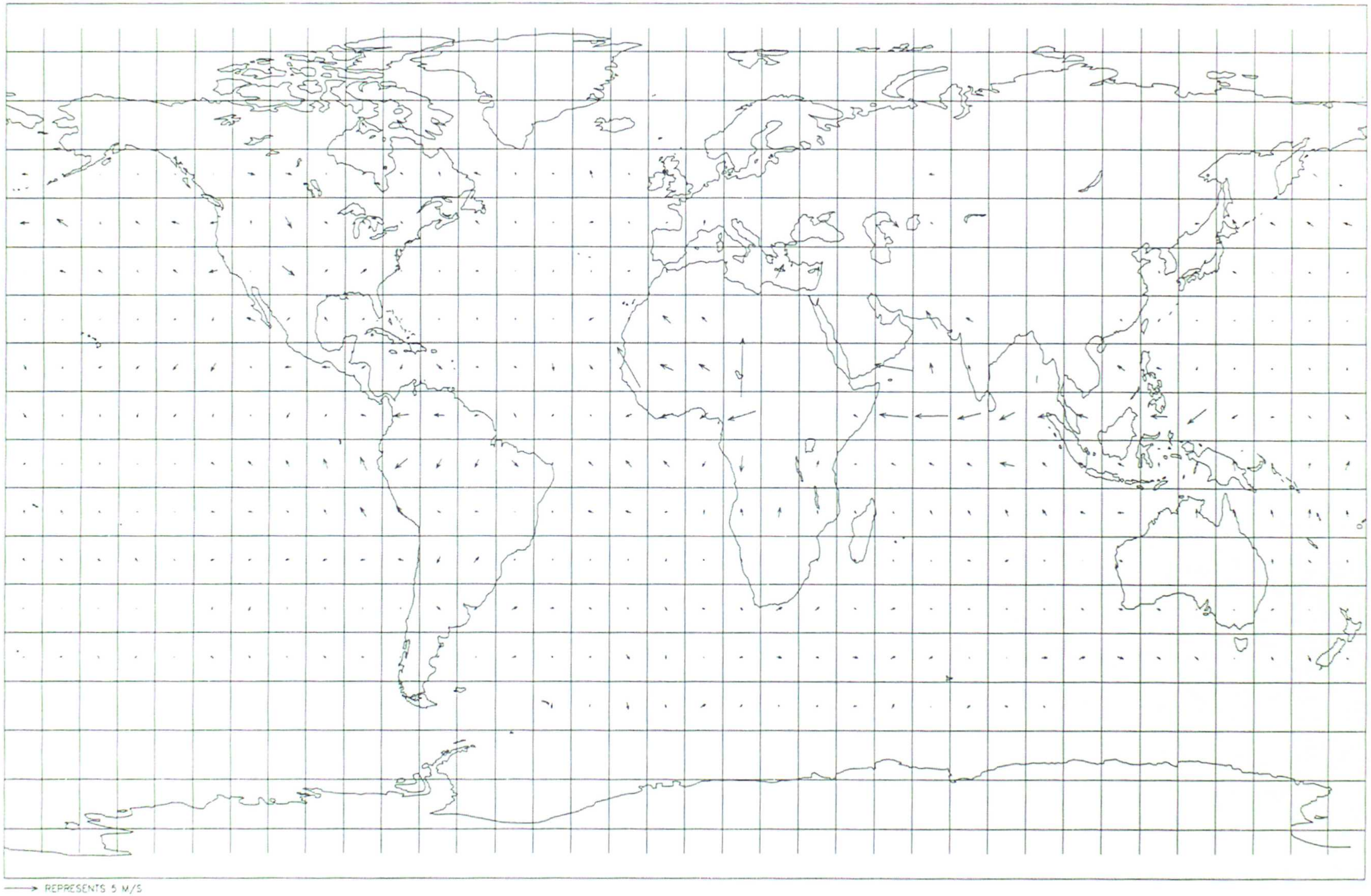
SATOB O–B VECTOR WIND DIFFERENCES BETWEEN 701–1000 HPA

JUNE 1999

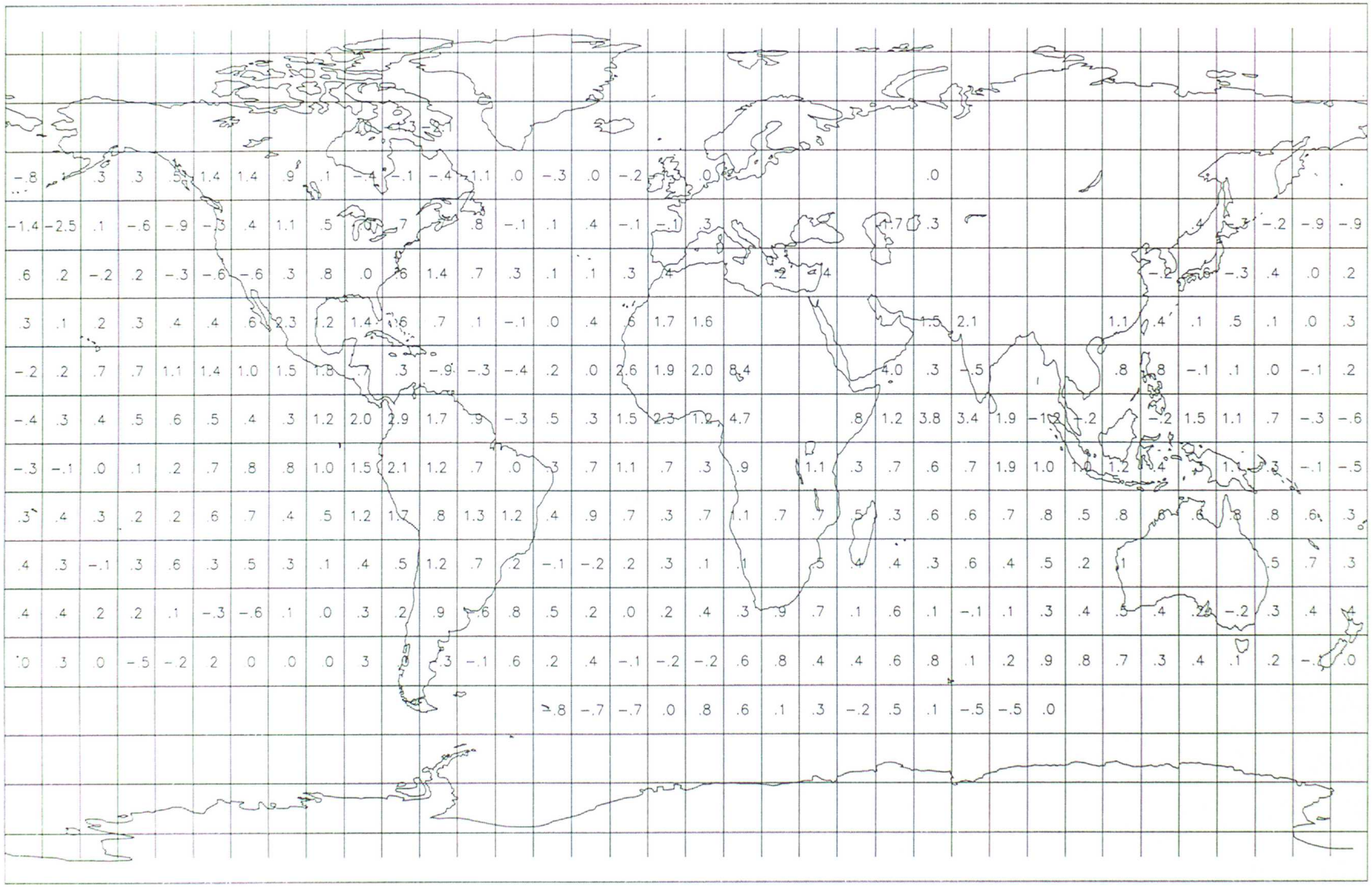
ALL OBSERVATIONS

ARROWS PLOTTED WHERE MORE THAN 10 OBS ARE PRESENT

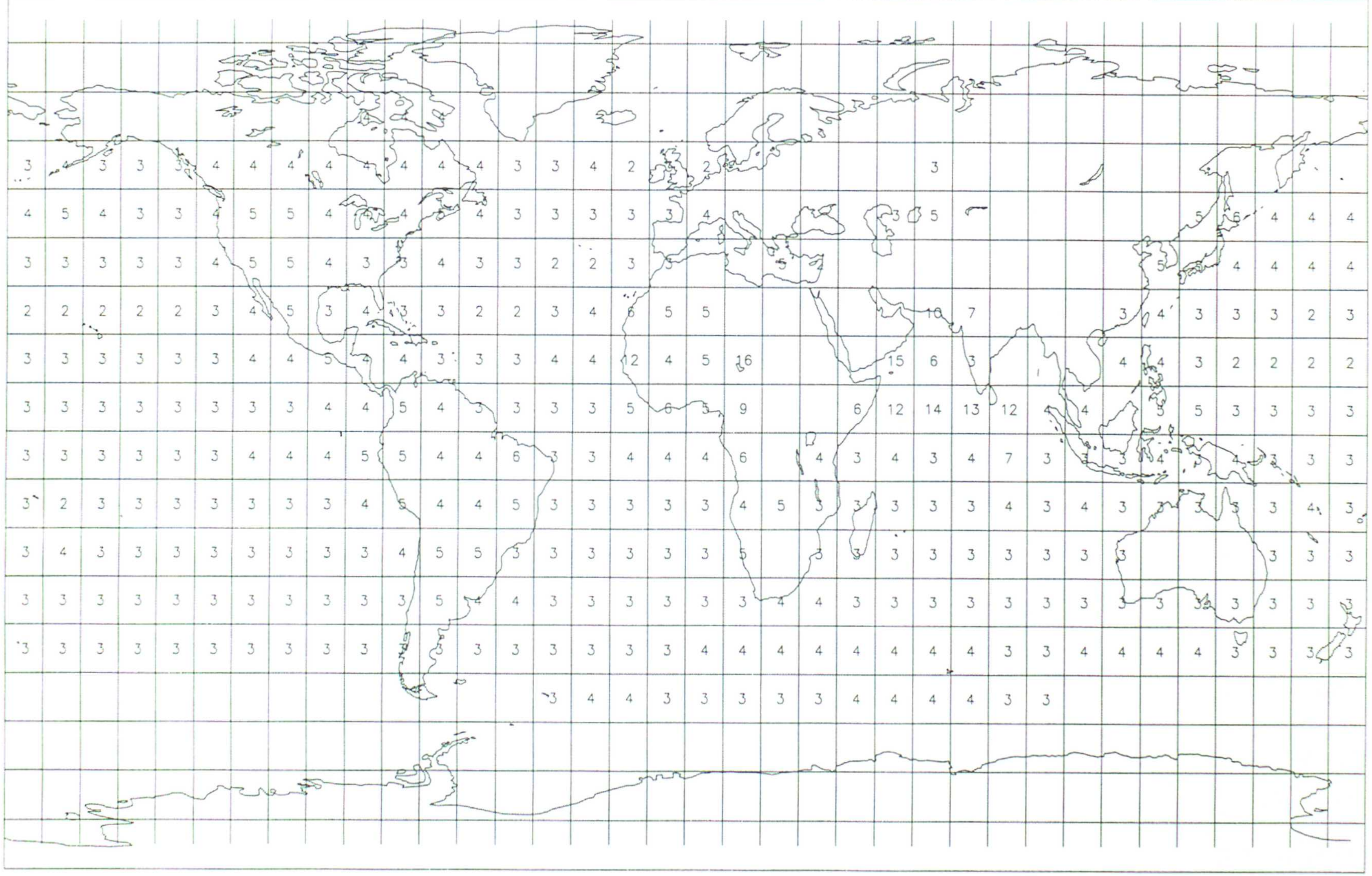
FIGURE 12


REPRESENTS 5 M/S

SATOBS : MEAN O-B SPEED DIFFERENCES (M/S) BETWEEN 701 AND 1000 HPA FIGURE 13
JUNE 1999
USING ALL OBSERVATIONS
VALUES ARE PRINTED WHERE MORE THAN 10 OBS ARE PRESENT

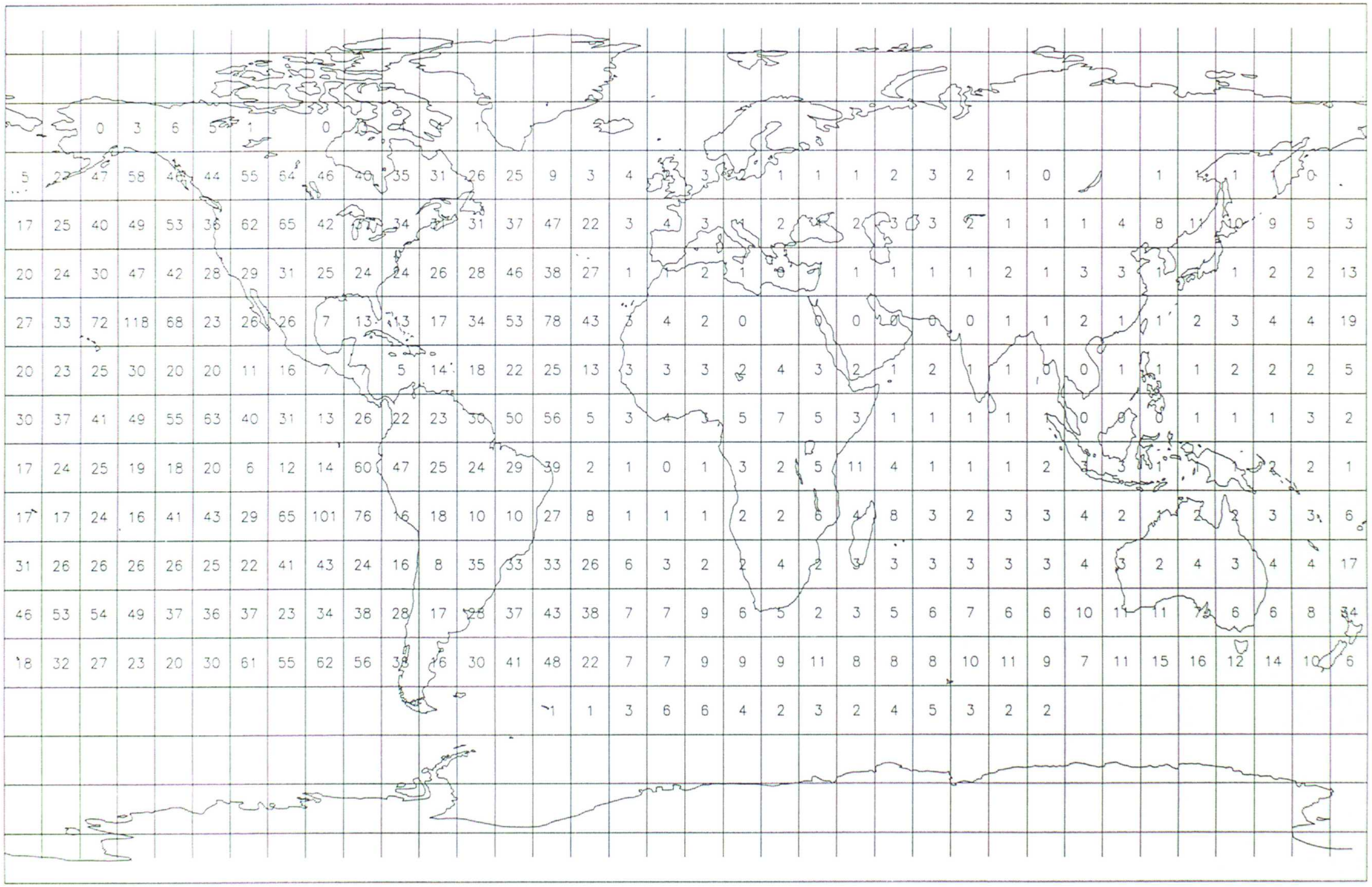

.3 -2.1
-.8 .1 .3 .3 .5 1.4 1.4 .9 .1 -.4 -.1 -.4 1.1 .0 -.3 .0 -.2 .0 .0
-1.4 -2.5 .1 -.6 -.9 -.3 .4 1.1 .5 1.0 .7 .8 -.1 .1 .4 -.1 -.1 .3 1.7 .3 .4 -.3 -.2 -.9 -.9
.6 .2 -.2 .2 -.3 -.6 -.6 .3 .8 .0 .6 1.4 .7 .3 .1 .1 .3 .4 .2 .4 -.2 .6 -.3 .4 .0 .2
.3 .1 .2 .3 .4 .4 .6 2.3 1.2 1.4 .6 .7 .1 -.1 .0 .4 .6 1.7 1.6 1.5 2.1 1.1 .4 .1 .5 .1 .0 .3
-.2 .2 .7 .7 1.1 1.4 1.0 1.5 1.8 .7 .3 -.9 -.3 -.4 .2 .0 2.6 1.9 2.0 8.4 4.0 .3 -.5 .8 .8 -.1 .1 .0 -.1 .2
-.4 .3 .4 .5 .6 .5 .4 .3 1.2 2.0 2.9 1.7 .9 -.3 .5 .3 1.5 2.3 1.2 4.7 .8 1.2 3.8 3.4 1.9 -1.2 -.2 -.2 1.5 1.1 .7 -.3 -.6
-.3 -.1 .0 .1 .2 .7 .8 .8 1.0 1.5 2.1 1.2 .7 .0 .3 .7 1.1 .7 .3 .9 1.1 .3 .7 .6 .7 1.9 1.0 1.0 1.2 .4 .3 1.1 .3 -.1 -.5
.3 .4 .3 .2 .2 .6 .7 .4 .5 1.2 1.7 .8 1.3 1.2 .4 .9 .7 .3 .7 1.1 .7 .7 .5 .3 .6 .6 .7 .8 .5 .8 .6 .6 .8 .8 .6 .3
.4 .3 -.1 .3 .6 .3 .5 .3 .1 .4 .5 1.2 .7 .2 -.1 -.2 .2 .3 .1 .1 .5 .4 .4 .3 .6 .4 .5 .2 .1 .5 .7 .3
.4 .4 .2 .2 .1 -.3 -.6 .1 .0 .3 .2 .9 .6 .8 .5 .2 .0 .2 .4 .3 .9 .7 .1 .6 .1 -.1 .1 .3 .4 .5 .4 .2 -.2 .3 .4 .4
.0 .3 .0 -.5 -.2 2 .0 .0 .0 3 .0 .3 -.1 .6 .2 .4 -.1 -.2 -.2 .6 .8 .4 .4 .6 .8 .1 .2 .9 .8 .7 .3 .4 .1 .2 -.1 .0
-.8 -.7 -.7 .0 .8 .6 .1 .3 -.2 .5 .1 -.5 -.5 .0

SATOBS : RMS O-B VECTOR DIFFERENCES (M/S) BETWEEN 701 AND 1000 HPA FIGURE 14
JUNE 1999
USING ALL OBSERVATIONS
VALUES ARE PRINTED WHERE MORE THAN 10 OBS ARE PRESENT



3	4	3	3	3	4	4	4	4	4	4	4	4	3	3	4	2		2						3											
4	5	4	3	3	4	5	5	4	4	4		4	3	3	3	3	3	4					3	5							5	6	4	4	4
3	3	3	3	3	4	5	5	4	3	3	4	3	3	2	2	3	3			5	4									5		4	4	4	4
2	2	2	2	2	3	4	5	3	4	3	3	2	2	3	4	6	5	5						10	7				3	4	3	3	3	2	3
3	3	3	3	3	3	4	4	5	4	4	3	3	3	4	4	12	4	5	16				15	6	3				4	4	3	2	2	2	2
3	3	3	3	3	3	3	3	4	4	5	4	3	3	3	3	5	6	5	9			6	12	14	13	12	4	4		5	5	3	3	3	3
3	3	3	3	3	3	4	4	4	5	5	4	4	6	3	3	4	4	4	6		4	3	4	3	4	7	3	3	3	4	3	4	3	3	3
3	2	3	3	3	3	3	3	3	4	5	4	4	5	3	3	3	3	3	4	5	3	3	3	3	3	4	3	4	3	3	3	3	3	4	3
3	4	3	3	3	3	3	3	3	3	4	5	5	3	3	3	3	3	3	5		3	3	3	3	3	3	3	3	3				3	3	3
3	3	3	3	3	3	3	3	3	3	3	5	4	4	3	3	3	3	3	3	4	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3
3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	4	4	4	4	4	4	4	4	3	3	4	4	4	4	3	3	3	3
														3	4	4	3	3	3	3	3	4	4	4	4	3	3								

AVERAGE DAILY NUMBER OF SATOB OBSERVATIONS BETWEEN 401 AND 700 HPA FIGURE 15
JUNE 1999


0 3 6 5 1 0 1
5 22 47 58 40 44 55 54 46 40 35 31 26 25 9 3 4 2 3 2 1 1 1 2 3 2 1 0 1 1 1 1 0
17 25 40 49 53 36 62 65 42 31 34 31 31 37 47 22 3 4 3 1 2 4 2 3 3 2 1 1 1 4 8 11 10 9 5 3
20 24 30 47 42 28 29 31 25 24 24 26 28 46 38 27 1 1 2 1 0 1 1 1 1 1 2 1 3 3 1 1 2 2 13
27 33 72 118 68 23 26 26 7 13 13 17 34 53 78 43 3 4 2 0 0 0 0 0 0 1 1 2 1 1 2 3 4 4 19
20 23 25 30 20 20 11 16 7 7 5 14 18 22 25 13 3 3 3 2 4 3 2 1 2 1 1 0 0 1 1 1 2 2 2 5
30 37 41 49 55 63 40 31 13 26 22 23 30 50 56 5 3 4 3 5 7 5 3 1 1 1 1 1 0 0 0 1 1 1 3 2
17 24 25 19 18 20 6 12 14 60 47 25 24 29 39 2 1 0 1 3 2 5 11 4 1 1 1 2 3 3 1 1 1 2 2 1
17 17 24 16 41 43 29 65 101 76 16 18 10 10 27 8 1 1 1 2 2 6 4 8 3 2 3 3 4 2 1 2 2 3 3 6
31 26 26 26 26 25 22 41 43 24 16 8 35 33 33 26 6 3 2 2 4 2 3 3 3 3 3 3 4 3 2 4 3 4 4 17
46 53 54 49 37 36 37 23 34 38 28 17 28 37 43 38 7 7 9 6 5 2 3 5 6 7 6 6 10 11 11 7 6 6 8 34
18 32 27 23 20 30 61 55 62 56 38 16 30 41 48 22 7 7 9 9 9 11 8 8 8 10 11 9 7 11 15 16 12 14 10 6
1 1 3 6 6 4 2 3 2 4 5 3 2 2

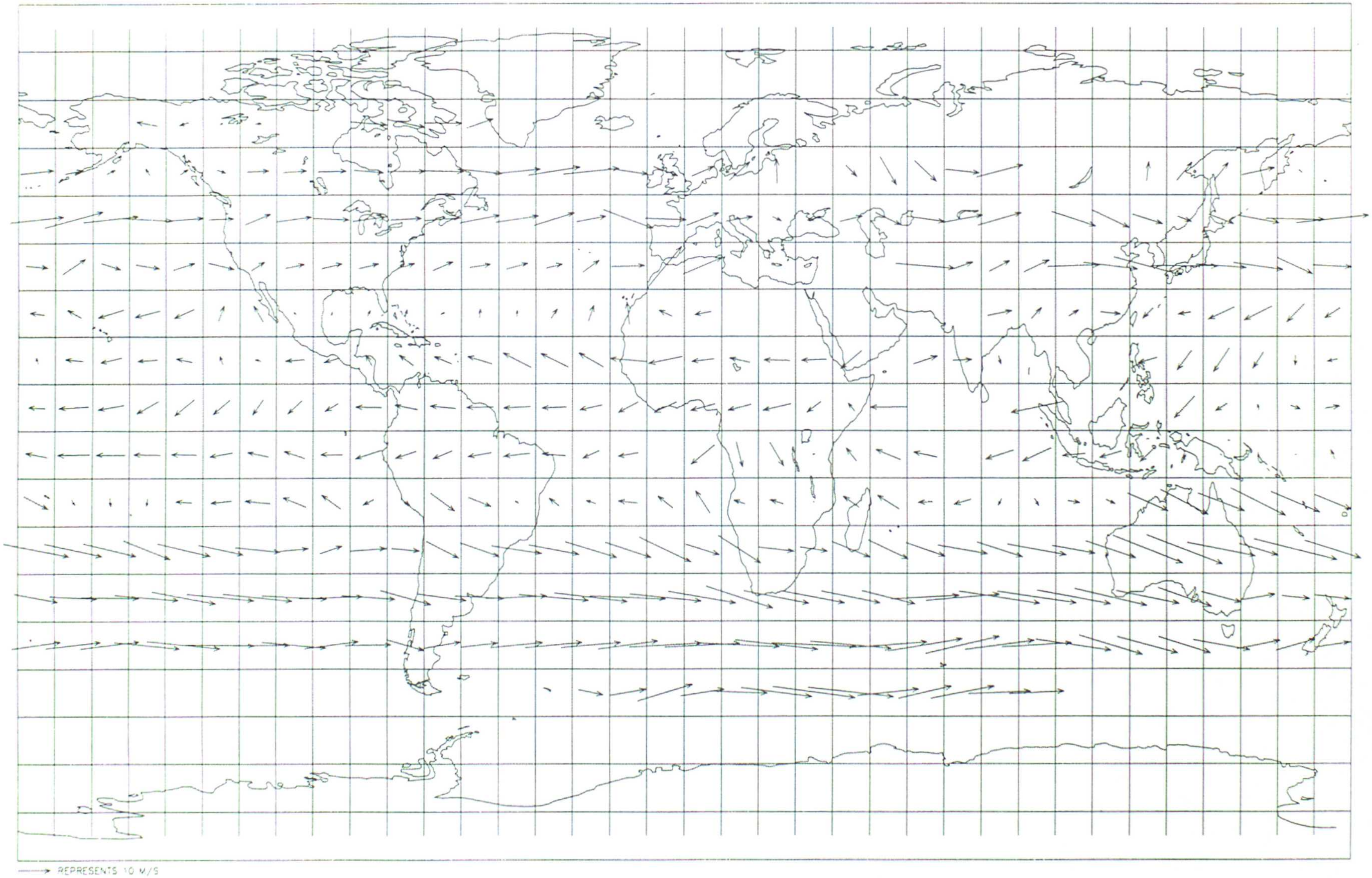
SATOB VECTOR MEAN WINDS BETWEEN 401–700 HPA

FIGURE 16

JUNE 1999

ALL OBSERVATIONS

ARROWS PLOTTED WHERE MORE THAN 10 OBS ARE PRESENT


REPRESENTS 10 M/S

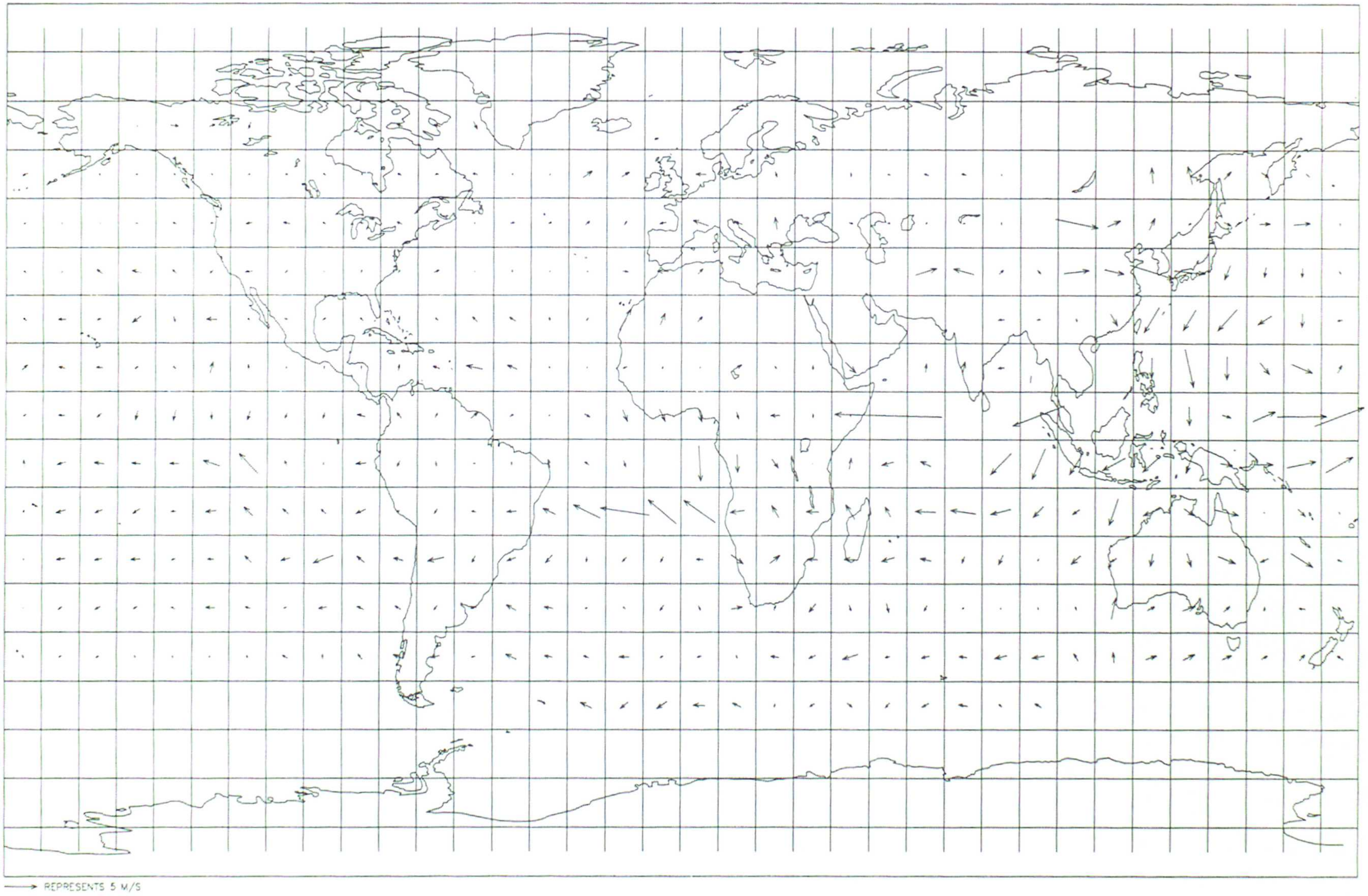
SATOB O–B VECTOR WIND DIFFERENCES BETWEEN 401–700 HPA

FIGURE 17

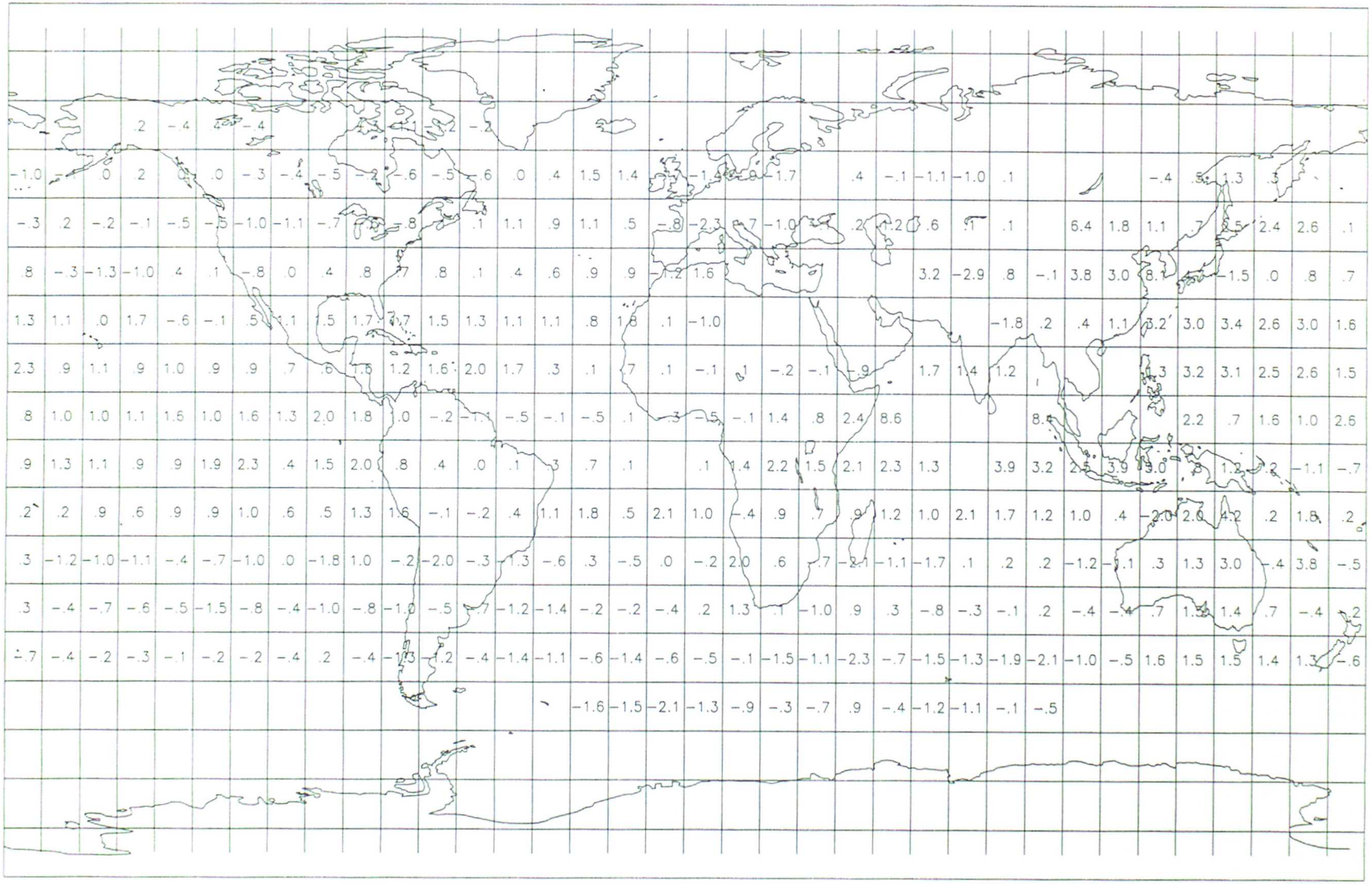
JUNE 1999

ALL OBSERVATIONS

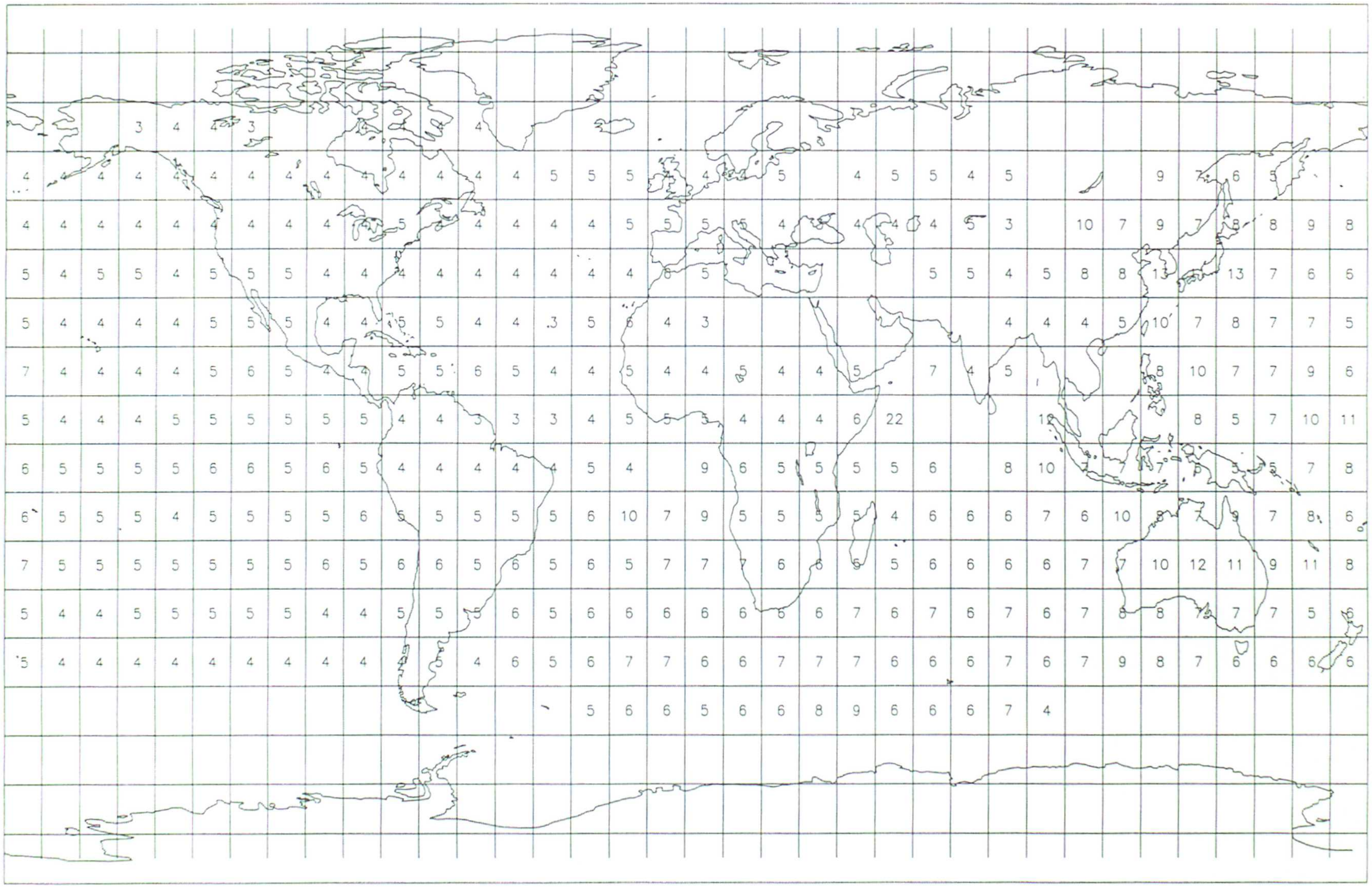
ARROWS PLOTTED WHERE MORE THAN 10 OBS ARE PRESENT


→ REPRESENTS 5 M/S

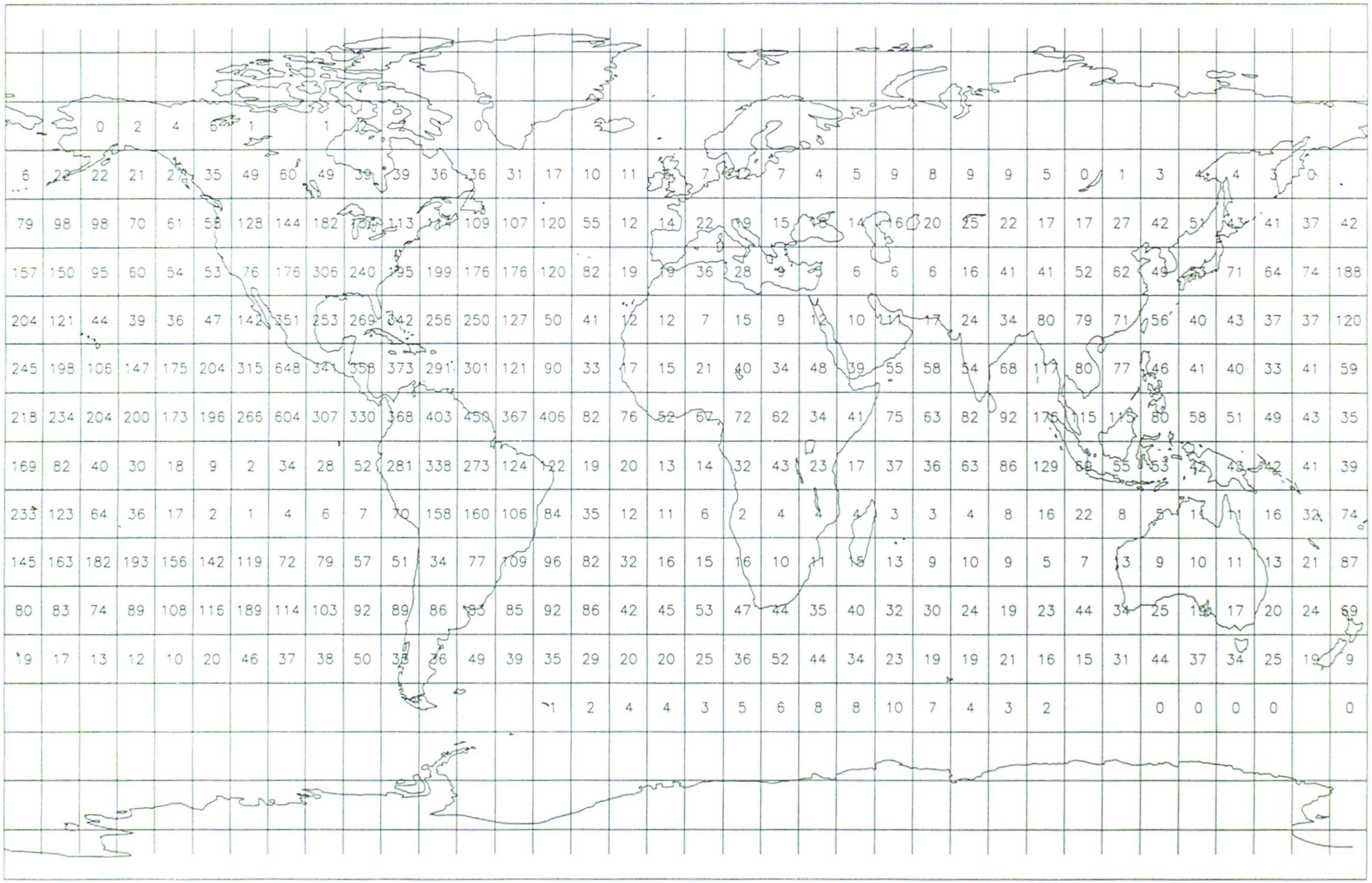
SATOBS : MEAN O–B SPEED DIFFERENCES (M/S) BETWEEN 401 AND 700 HPA FIGURE 18
JUNE 1999
USING ALL OBSERVATIONS
VALUES ARE PRINTED WHERE MORE THAN 10 OBS ARE PRESENT


.2 –.4 .4 –.4 .7 –.1 –1.2 –.2
–1.0 –.1 .0 .2 .0 .0 –.3 –.4 –.5 –.2 –.6 –.5 –.6 .0 .4 1.5 1.4 –1.4 –.9 –1.7 .4 –.1 –1.1 –1.0 .1 –.4 .5 1.3 .3
–.3 .2 –.2 –.1 –.5 –.5 –1.0 –1.1 –.7 –.8 .1 1.1 .9 1.1 .5 –.8 –2.3 –.7 –1.0 .2 –1.2 .6 .1 .1 6.4 1.8 1.1 .7 2.5 2.4 2.6 .1
.8 –.3 –1.3 –1.0 .4 .1 –.8 .0 .4 .8 .7 .8 .1 .4 .6 .9 .9 –1.2 1.6 3.2 –2.9 .8 –.1 3.8 3.0 8.1 –1.5 .0 .8 .7
1.3 1.1 .0 1.7 –.6 –.1 .5 1.1 1.5 1.7 1.7 1.5 1.3 1.1 1.1 .8 1.8 .1 –1.0 –1.8 .2 .4 1.1 3.2 3.0 3.4 2.6 3.0 1.6
2.3 .9 1.1 .9 1.0 .9 .9 .7 .6 1.6 1.2 1.6 2.0 1.7 .3 .1 .7 .1 –.1 .1 –.2 –.1 –.9 1.7 1.4 1.2 1.3 3.2 3.1 2.5 2.6 1.5
.8 1.0 1.0 1.1 1.6 1.0 1.6 1.3 2.0 1.8 1.0 –.2 –1.1 –.5 –.1 –.5 .1 –.3 –.5 –.1 1.4 .8 2.4 8.6 8.4 2.2 .7 1.6 1.0 2.6
.9 1.3 1.1 .9 .9 1.9 2.3 .4 1.5 2.0 .8 .4 .0 .1 .3 .7 .1 .1 1.4 2.2 1.5 2.1 2.3 1.3 3.9 3.2 2.5 3.9 3.0 .8 1.2 .2 –1.1 –.7
.2 .2 .9 .6 .9 .9 1.0 .6 .5 1.3 1.6 –.1 –.2 .4 1.1 1.8 .5 2.1 1.0 –.4 .9 .7 .9 1.2 1.0 2.1 1.7 1.2 1.0 .4 –2.0 2.0 4.2 .2 1.8 .2
.3 –1.2 –1.0 –1.1 –.4 –.7 –1.0 .0 –1.8 1.0 –.2 –2.0 –.3 –1.3 –.6 .3 –.5 .0 –.2 2.0 .6 –.7 –2.1 –1.1 –1.7 .1 .2 .2 –1.2 –1.1 .3 1.3 3.0 –.4 3.8 –.5
.3 –.4 –.7 –.6 –.5 –1.5 –.8 –.4 –1.0 –.8 –1.0 –.5 –.7 –1.2 –1.4 –.2 –.2 –.4 .2 1.3 .1 –1.0 .9 .3 –.8 –.3 –.1 .2 –.4 –.4 .7 1.5 1.4 .7 –.4 .2
–.7 –.4 –.2 –.3 –.1 –.2 –.2 –.4 .2 –.4 –1.3 –1.2 –.4 –1.4 –1.1 –.6 –1.4 –.6 –.5 –.1 –1.5 –1.1 –2.3 –.7 –1.5 –1.3 –1.9 –2.1 –1.0 –.5 1.6 1.5 1.5 1.4 1.3 –.6
–1.6 –1.5 –2.1 –1.3 –.9 –.3 –.7 .9 –.4 –1.2 –1.1 –.1 –.5

SATOBS : RMS O-B VECTOR DIFFERENCES (M/S) BETWEEN 401 AND 700 HPA FIGURE 19
JUNE 1999
USING ALL OBSERVATIONS
VALUES ARE PRINTED WHERE MORE THAN 10 OBS ARE PRESENT



AVERAGE DAILY NUMBER OF SATOB OBSERVATIONS BETWEEN 101 AND 400 HPA FIGURE 20
JUNE 1999



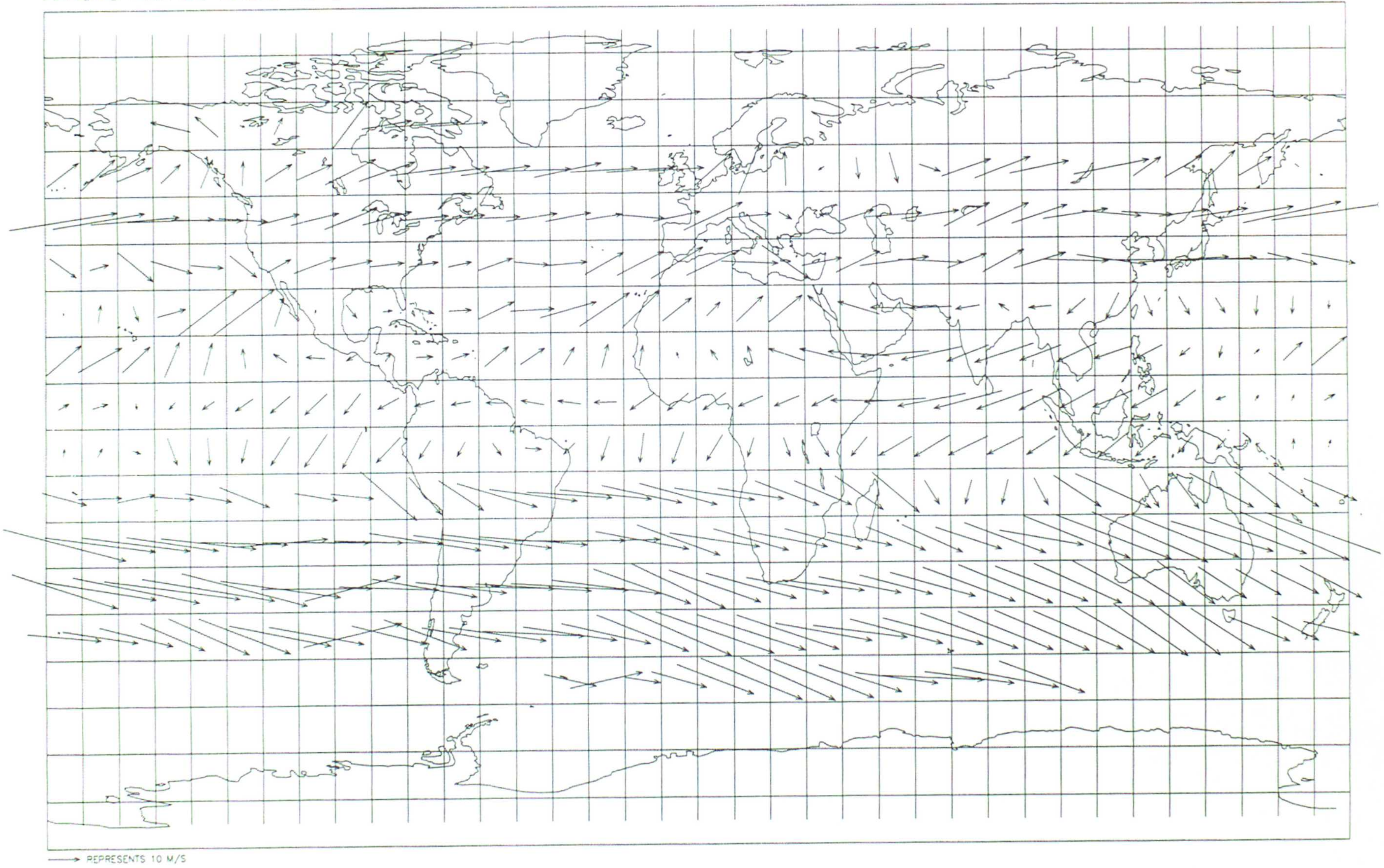
		0	2	4	6	1		1		2	0																								
6	22	22	21	27	35	49	60	49	39	39	36	36	31	17	10	11	6	7	12	7	4	5	9	8	9	9	5	0	1	3	4	4	3	0	
79	98	98	70	61	58	128	144	182	130	113	114	109	107	120	55	12	14	22	19	15	18	14	16	20	25	22	17	17	27	42	51	43	41	37	42
157	150	95	60	54	53	76	176	306	240	195	199	176	176	120	82	19	19	36	28	9	5	6	6	6	16	41	41	52	62	49	53	71	64	74	188
204	121	44	39	36	47	142	351	253	269	342	256	250	127	50	41	12	12	7	15	9	12	10	11	17	24	34	80	79	71	56	40	43	37	37	120
245	198	106	147	175	204	315	648	341	358	373	291	301	121	90	33	17	15	21	40	34	48	39	55	58	54	68	117	80	77	46	41	40	33	41	59
218	234	204	200	173	196	266	604	307	330	368	403	450	367	406	82	76	52	67	72	62	34	41	75	63	82	92	176	115	115	80	58	51	49	43	35
169	82	40	30	18	9	2	34	28	52	281	338	273	124	122	19	20	13	14	32	43	23	17	37	36	63	86	129	69	55	53	42	43	42	41	39
233	123	64	36	17	2	1	4	6	7	70	158	160	106	84	35	12	11	6	2	4	4	4	3	3	4	8	16	22	8	5	11	11	16	32	74
145	163	182	193	156	142	119	72	79	57	51	34	77	109	96	82	32	16	15	16	10	11	15	13	9	10	9	5	7	13	9	10	11	13	21	87
80	83	74	89	108	116	189	114	103	92	89	86	83	85	92	86	42	45	53	47	44	35	40	32	30	24	19	23	44	34	25	19	17	20	24	69
19	17	13	12	10	20	46	37	38	50	33	36	49	39	35	29	20	20	25	36	52	44	34	23	19	19	21	16	15	31	44	37	34	25	19	9
														1	2	4	4	3	5	6	8	8	10	7	4	3	2			0	0	0	0		0

SATOB METEOSAT W/V VECTOR MEAN WINDS BETWEEN 101–400 HPA FIGURE 21

JUNE 1999

ALL OBSERVATIONS

ARROWS PLOTTED WHERE MORE THAN 10 OBS ARE PRESENT


REPRESENTS 10 M/S

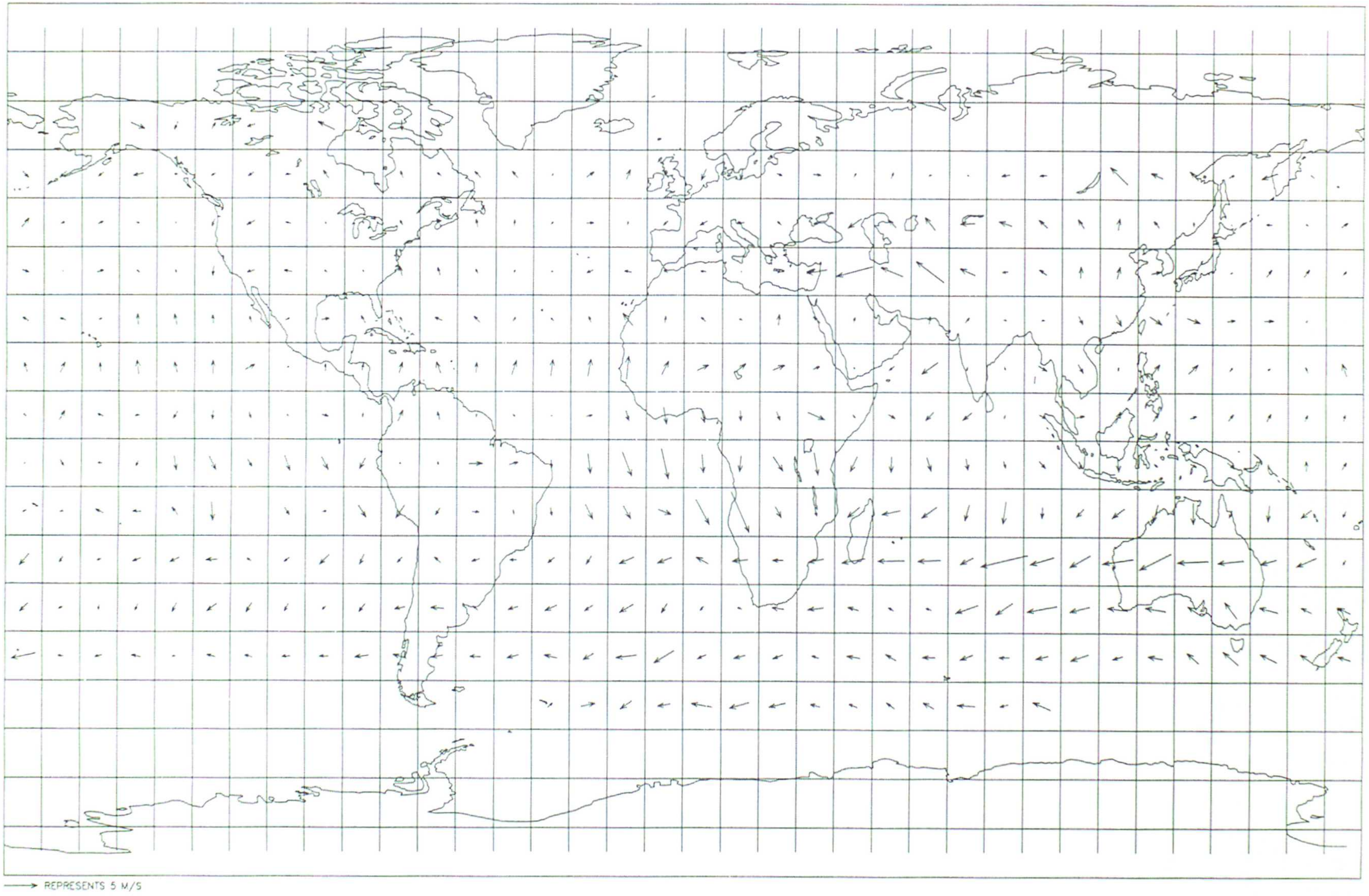
SATOB O–B VECTOR WIND DIFFERENCES BETWEEN 101–400 HPA

JUNE 1999

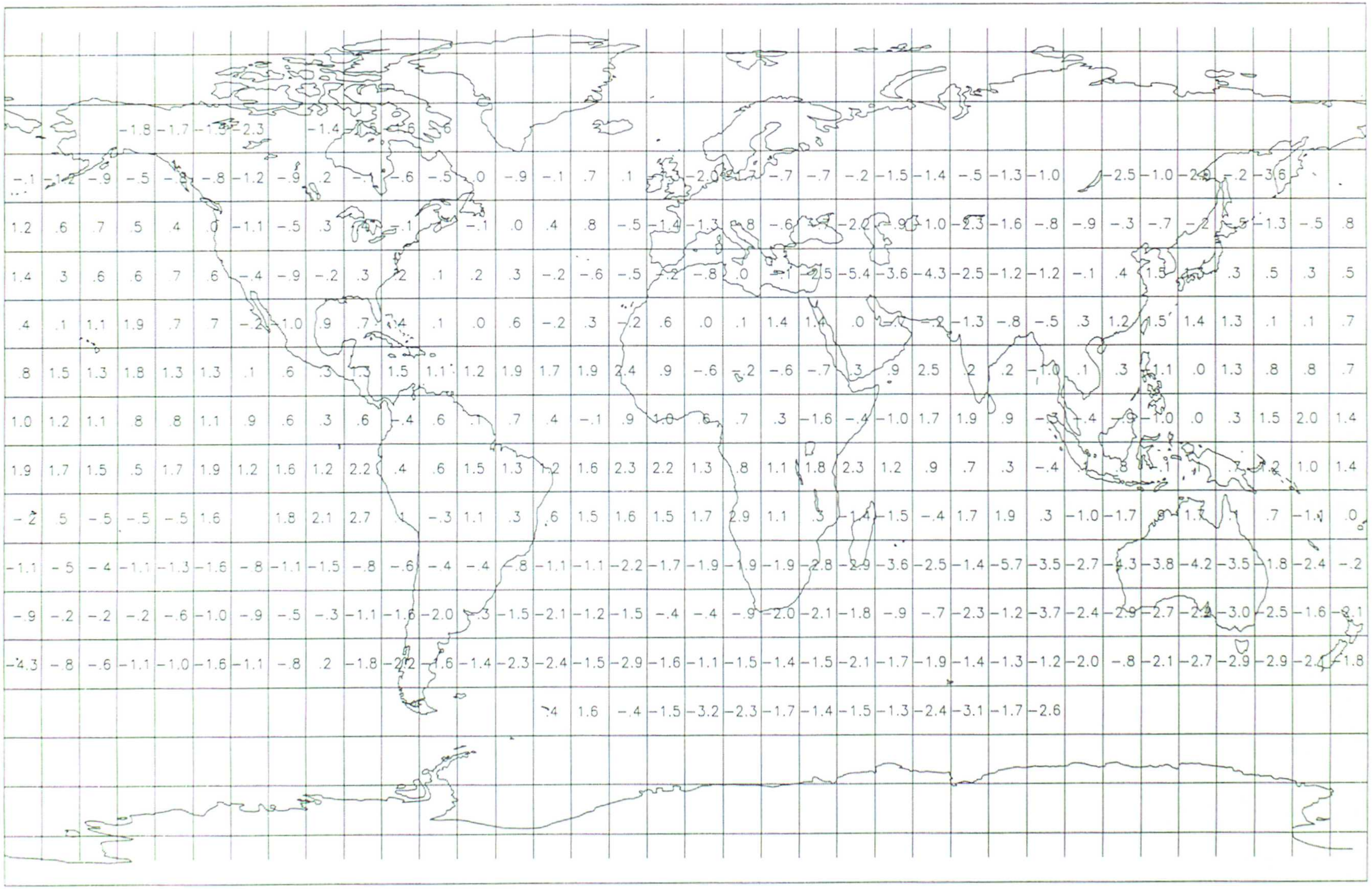
ALL OBSERVATIONS

ARROWS PLOTTED WHERE MORE THAN 10 OBS ARE PRESENT

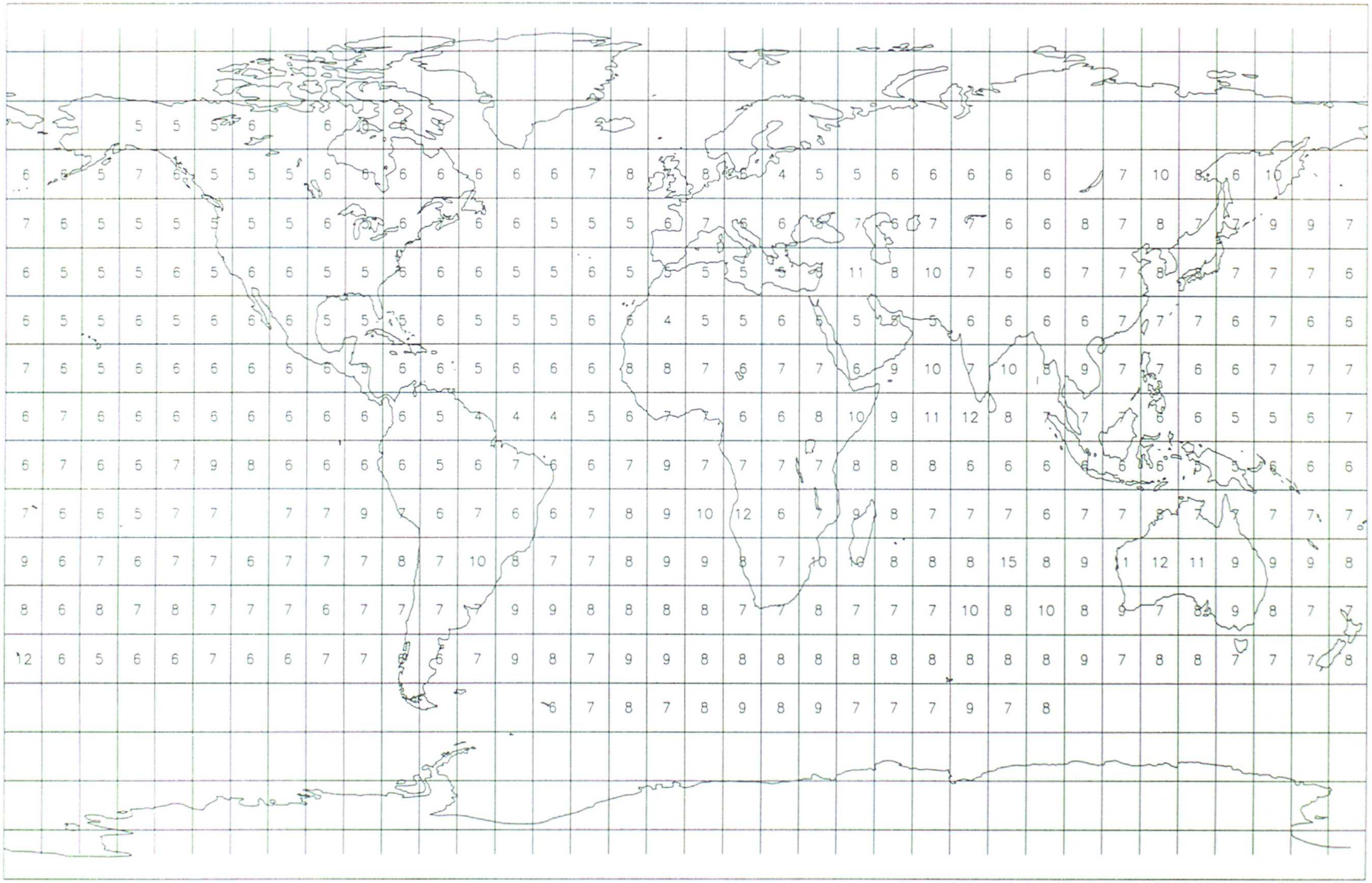
FIGURE 22


REPRESENTS 5 M/S

SATOBS : MEAN O-B SPEED DIFFERENCES (M/S) BETWEEN 101 AND 400 HPA FIGURE 23
JUNE 1999
USING ALL OBSERVATIONS
VALUES ARE PRINTED WHERE MORE THAN 10 OBS ARE PRESENT


-1.8 -1.7 -1.5 -2.3 -1.4 -1.5 -1.6 -.6
-.1 -1.2 -.9 -.5 -.8 -.8 -1.2 -.9 .2 -.1 -.6 -.5 .0 -.9 -.1 .7 .1 -2.0 -1.7 -.7 -.7 -.2 -1.5 -1.4 -.5 -1.3 -1.0 -2.5 -1.0 -2.0 -.2 -3.6
1.2 .6 .7 .5 .4 .0 -1.1 -.5 .3 -.1 -.1 .0 .4 .8 -.5 -1.4 -1.3 -.8 -.6 -.7 -2.2 -.9 -1.0 -2.3 -1.6 -.8 -.9 -.3 -.7 -.2 -.5 -1.3 -.5 .8
1.4 .3 .6 .6 .7 .6 -.4 -.9 -.2 .3 .2 .1 .2 .3 -.2 -.6 -.5 -.2 -.8 .0 -.1 -2.5 -5.4 -3.6 -4.3 -2.5 -1.2 -1.2 -.1 .4 1.5 1.3 .3 .5 .3 .5
.4 .1 1.1 1.9 .7 .7 -.2 -1.0 .9 .7 .4 .1 .0 .6 -.2 .3 -.2 .6 .0 .1 1.4 1.4 .0 -.7 -.2 -1.3 -.8 -.5 .3 1.2 1.5 1.4 1.3 .1 .1 .7
.8 1.5 1.3 1.8 1.3 1.3 .1 .6 .3 1.3 1.5 1.1 1.2 1.9 1.7 1.9 2.4 .9 -.6 -.2 -.6 -.7 .3 .9 2.5 .2 .2 -1.0 .1 .3 1.1 .0 1.3 .8 .8 .7
1.0 1.2 1.1 .8 .8 1.1 .9 .6 .3 .6 -.4 .6 .1 .7 .4 -.1 .9 1.0 .6 .7 .3 -1.6 -.4 -1.0 1.7 1.9 .9 -.3 -.4 -.9 -1.0 .0 .3 1.5 2.0 1.4
1.9 1.7 1.5 .5 1.7 1.9 1.2 1.6 1.2 2.2 .4 .6 1.5 1.3 1.2 1.6 2.3 2.2 1.3 .8 1.1 1.8 2.3 1.2 .9 .7 .3 -.4 .8 .1 .1 .7 .2 1.0 1.4
-.2 .5 -.5 -.5 -.5 1.6 1.8 2.1 2.7 .1 -.3 1.1 .3 .6 1.5 1.6 1.5 1.7 2.9 1.1 .3 -1.4 -1.5 -.4 1.7 1.9 .3 -1.0 -1.7 .9 1.7 .1 .7 -1.1 .0
-1.1 -.5 -.4 -1.1 -1.3 -1.6 -.8 -1.1 -1.5 -.8 -.6 -.4 -.4 -.8 -1.1 -1.1 -2.2 -1.7 -1.9 -1.9 -1.9 -2.8 -2.9 -3.6 -2.5 -1.4 -5.7 -3.5 -2.7 -4.3 -3.8 -4.2 -3.5 -1.8 -2.4 -.2
-.9 -.2 -.2 -.2 -.6 -1.0 -.9 -.5 -.3 -1.1 -1.6 -2.0 -.3 -1.5 -2.1 -1.2 -1.5 -.4 -.4 -.9 -2.0 -2.1 -1.8 -.9 -.7 -2.3 -1.2 -3.7 -2.4 -2.9 -2.7 -2.4 -3.0 -2.5 -1.6 -2.1
-4.3 -.8 -.6 -1.1 -1.0 -1.6 -1.1 -.8 .2 -1.8 -2.2 -1.6 -1.4 -2.3 -2.4 -1.5 -2.9 -1.6 -1.1 -1.5 -1.4 -1.5 -2.1 -1.7 -1.9 -1.4 -1.3 -1.2 -2.0 -.8 -2.1 -2.7 -2.9 -2.9 -2.4 -1.8
.4 1.6 -.4 -1.5 -3.2 -2.3 -1.7 -1.4 -1.5 -1.3 -2.4 -3.1 -1.7 -2.6

SATOBS : RMS O-B VECTOR DIFFERENCES (M/S) BETWEEN 101 AND 400 HPA FIGURE 24
JUNE 1999
USING ALL OBSERVATIONS
VALUES ARE PRINTED WHERE MORE THAN 10 OBS ARE PRESENT


5 5 5 6 6 6 6
6 6 5 7 6 5 5 5 6 6 6 6 6 6 6 7 8 8 5 4 5 5 6 6 6 6 6 7 10 8 6 10
7 6 5 5 5 5 5 5 6 5 6 6 6 5 5 5 6 7 6 6 5 7 6 7 7 6 6 8 7 8 7 7 9 9 7
6 5 5 5 6 5 6 6 5 5 6 6 6 5 5 6 5 5 5 5 5 8 11 8 10 7 6 6 7 7 8 8 7 7 7 6
6 5 5 6 5 6 6 6 5 5 5 6 5 5 5 6 6 4 5 5 6 6 5 5 5 6 6 6 6 7 7 7 6 7 6 6
7 6 5 6 6 6 6 6 6 5 6 6 5 6 6 6 8 8 7 6 7 7 6 9 10 7 10 8 9 7 7 6 6 7 7 7
6 7 6 6 6 6 6 6 6 6 6 5 4 4 4 5 6 7 7 6 6 8 10 9 11 12 8 7 7 7 6 6 5 5 6 7
6 7 6 6 7 9 8 6 6 6 6 5 6 7 6 6 7 9 7 7 7 7 8 8 8 6 6 6 6 6 6 5 5 6 6 6
7 6 6 5 7 7 7 7 9 7 6 7 6 6 7 8 9 10 12 6 7 9 8 7 7 7 6 7 7 8 7 7 7 7 7
9 6 7 6 7 7 6 7 7 7 8 7 10 8 7 7 8 9 9 8 7 10 10 8 8 8 15 8 9 11 12 11 9 9 9 8
8 6 8 7 8 7 7 7 6 7 7 7 7 9 9 8 8 8 8 7 7 8 7 7 7 10 8 10 8 9 7 8 9 8 7 7
12 6 5 6 6 7 6 6 7 7 8 6 7 9 8 7 9 9 8 8 8 8 8 8 8 8 8 8 8 9 7 8 8 7 7 7 8
6 7 8 7 8 9 8 9 7 7 7 9 7 8

MONITORING OF SATELLITE TEMPERATURES

MONITORING CENTRE: BRACKNELL

MONTH: June 1999

Monitoring procedures

Period :One calendar month.

Data monitored :Reports from NOAA-15.

Standard of comparison :Background field from UKMO global model.

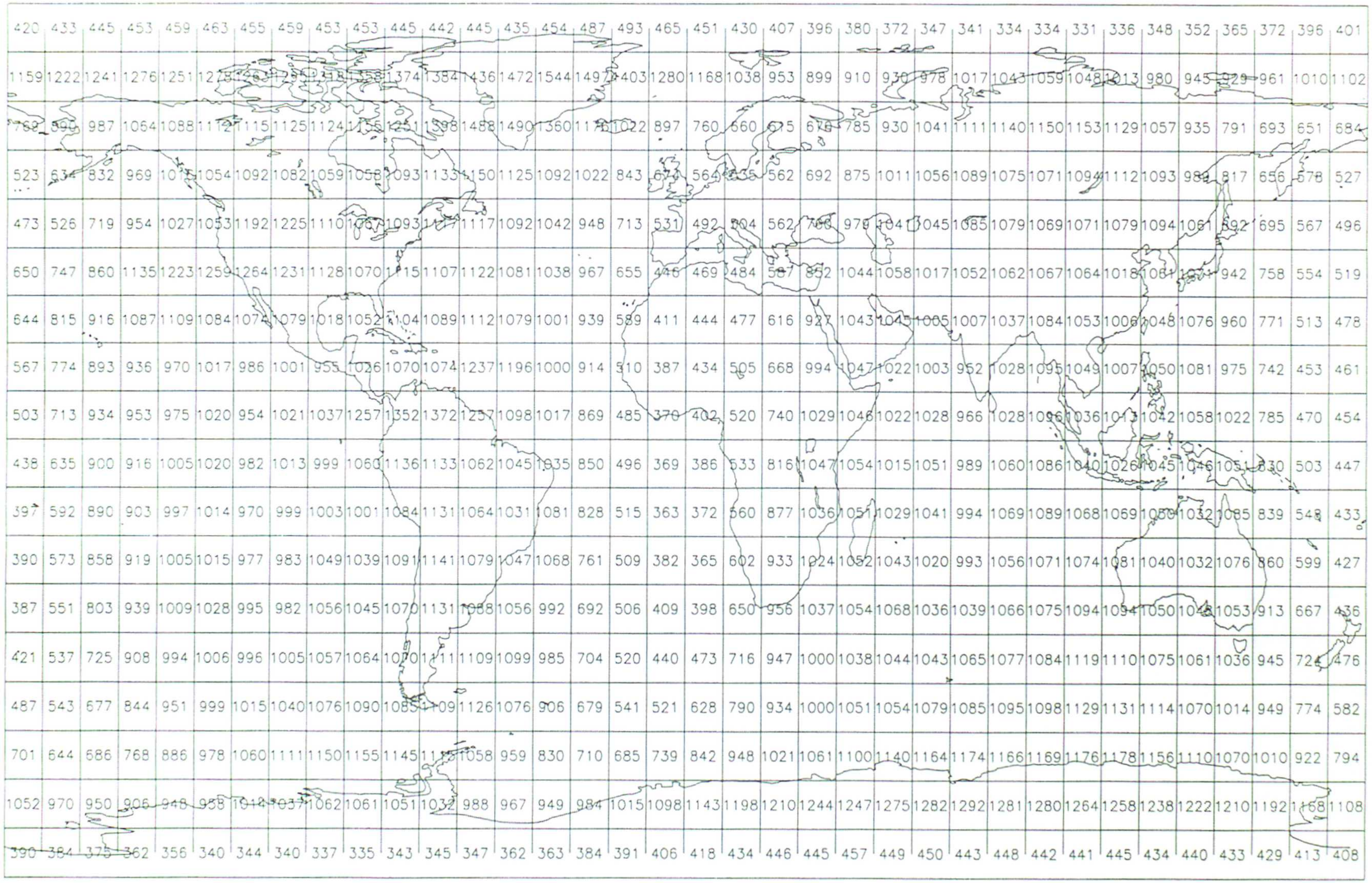
Selection Criteria :All soundings.

Data Extracted :Sounding channels (and approximate weighting function peaks, hPa)
HIRS8 (Surface)
HIRS15 (700)
HIRS11 (500-700)
HIRS4 (400)
AMSUA5 (700)
AMSUA7 (300)
AMSUA9 (100)

:Mean and standard deviation observation-minus-background brightness temperature differences

ATOVS : MEAN DAILY NUMBER OF OBSERVATIONS
JUNE 1999
NOAA-15, USING ALL OBSERVATIONS

FIGURE 25

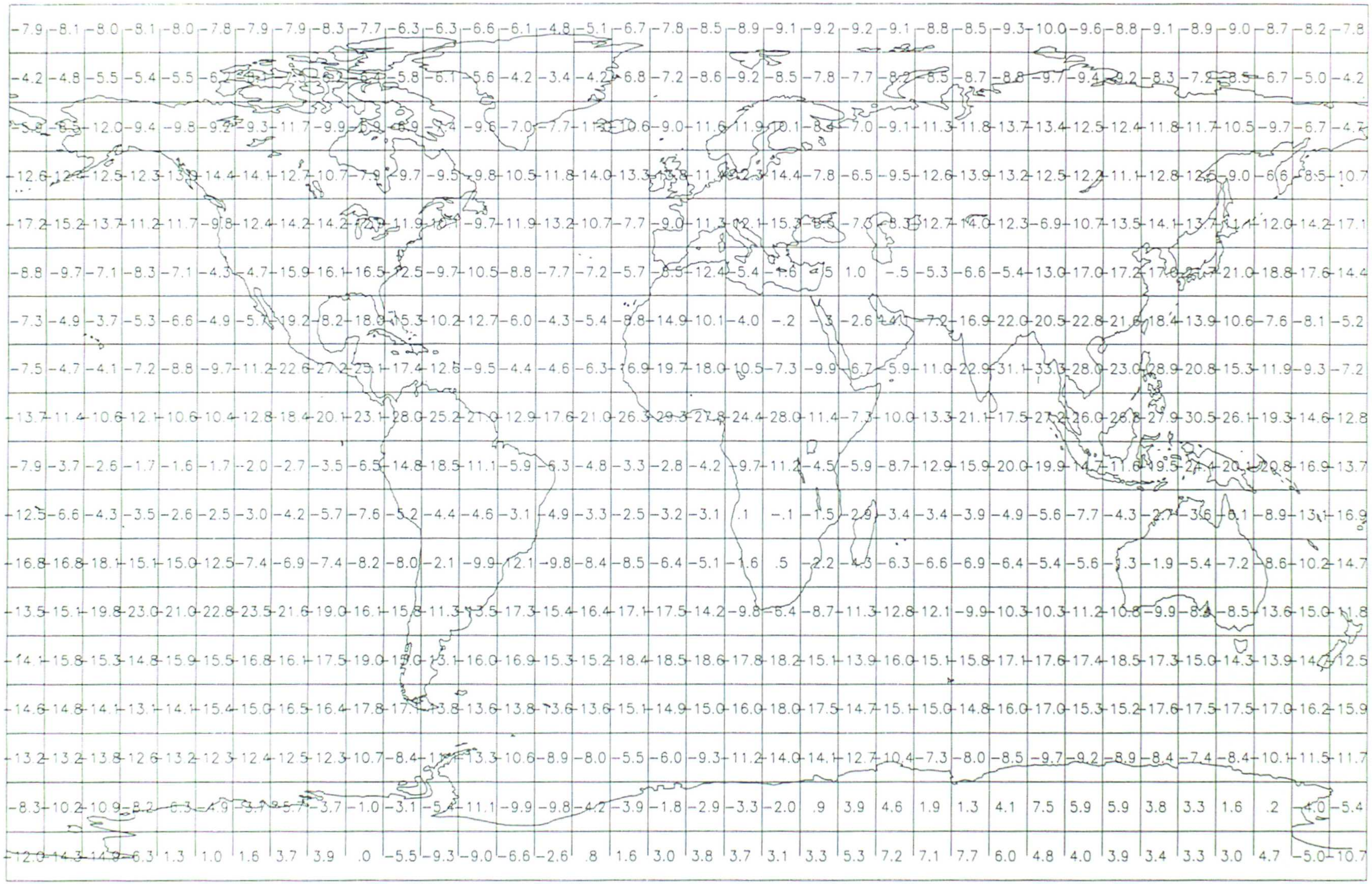


420	433	445	453	459	463	455	459	453	453	445	442	445	435	454	487	493	465	451	430	407	396	380	372	347	341	334	334	331	336	348	352	365	372	396	401
1159	1222	1241	1276	1251	1278	1263	1295	1318	1358	1374	1384	1436	1472	1544	1497	1403	1280	1168	1038	953	899	910	930	978	1017	1043	1059	1048	1013	980	945	929	961	1010	1102
768	890	987	1064	1088	1112	1115	1125	1124	1155	1251	1398	1488	1490	1360	1176	1022	897	760	660	615	676	785	930	1041	1111	1140	1150	1153	1129	1057	935	791	693	651	684
523	634	832	969	1015	1054	1092	1082	1059	1058	1093	1133	1150	1125	1092	1022	843	674	564	535	562	692	875	1011	1056	1089	1075	1071	1094	1112	1093	984	817	656	578	527
473	526	719	954	1027	1053	1192	1225	1110	1067	1093	1117	1117	1092	1042	948	713	531	492	504	562	766	979	1041	1045	1085	1079	1069	1071	1079	1094	1061	892	695	567	496
650	747	860	1135	1223	1259	1264	1231	1128	1070	1115	1107	1122	1081	1038	967	655	446	469	484	587	852	1044	1058	1017	1052	1062	1067	1064	1018	1061	1071	942	758	554	519
644	815	916	1087	1109	1084	1074	1079	1018	1052	1104	1089	1112	1079	1001	939	589	411	444	477	616	927	1043	1045	1005	1007	1037	1084	1053	1006	1048	1076	960	771	513	478
567	774	893	936	970	1017	986	1001	955	1026	1070	1074	1237	1196	1000	914	510	387	434	505	668	994	1047	1022	1003	952	1028	1095	1049	1007	1050	1081	975	742	453	461
503	713	934	953	975	1020	954	1021	1037	1257	1352	1372	1257	1098	1017	869	485	370	402	520	740	1029	1046	1022	1028	966	1028	1096	1036	1013	1042	1058	1022	785	470	454
438	635	900	916	1005	1020	982	1013	999	1060	1136	1133	1062	1045	1035	850	496	369	386	533	816	1047	1054	1015	1051	989	1060	1086	1040	1026	1045	1046	1051	830	503	447
397	592	890	903	997	1014	970	999	1003	1001	1084	1131	1064	1031	1081	828	515	363	372	560	877	1036	1051	1029	1041	994	1069	1089	1068	1069	1050	1032	1085	839	548	433
390	573	858	919	1005	1015	977	983	1049	1039	1091	1141	1079	1047	1068	761	509	382	365	602	933	1024	1052	1043	1020	993	1056	1071	1074	1081	1040	1032	1076	860	599	427
387	551	803	939	1009	1028	995	982	1056	1045	1070	1131	1088	1056	992	692	506	409	398	650	956	1037	1054	1068	1036	1039	1066	1075	1094	1094	1050	1048	1053	913	667	436
421	537	725	908	994	1006	996	1005	1057	1064	1070	1111	1109	1099	985	704	520	440	473	716	947	1000	1038	1044	1043	1065	1077	1084	1119	1110	1075	1061	1036	945	724	476
487	543	677	844	951	999	1015	1040	1076	1090	1085	1109	1126	1076	906	679	541	521	628	790	934	1000	1051	1054	1079	1085	1095	1098	1129	1131	1114	1070	1014	949	774	582
701	644	686	768	886	978	1060	1111	1150	1155	1145	1115	1058	959	830	710	685	739	842	948	1021	1061	1100	1140	1164	1174	1166	1169	1176	1178	1156	1110	1070	1010	922	794
1052	970	950	906	948	958	1018	1037	1062	1061	1051	1032	988	967	949	984	1015	1098	1143	1198	1210	1244	1247	1275	1282	1292	1281	1280	1264	1258	1238	1222	1210	1192	1168	1108
390	384	375	362	356	340	344	340	337	335	343	345	347	362	363	384	391	406	418	434	446	445	457	449	450	443	448	442	441	445	434	440	433	429	413	408

ATOVS : MEAN O–B BRIGHTNESS TEMPERATURE DIFFERENCES (DEG C)

FIGURE 26

JUNE 1999 : HIRS8 channel (Surface)
NOAA–15, USING ALL OBSERVATIONS



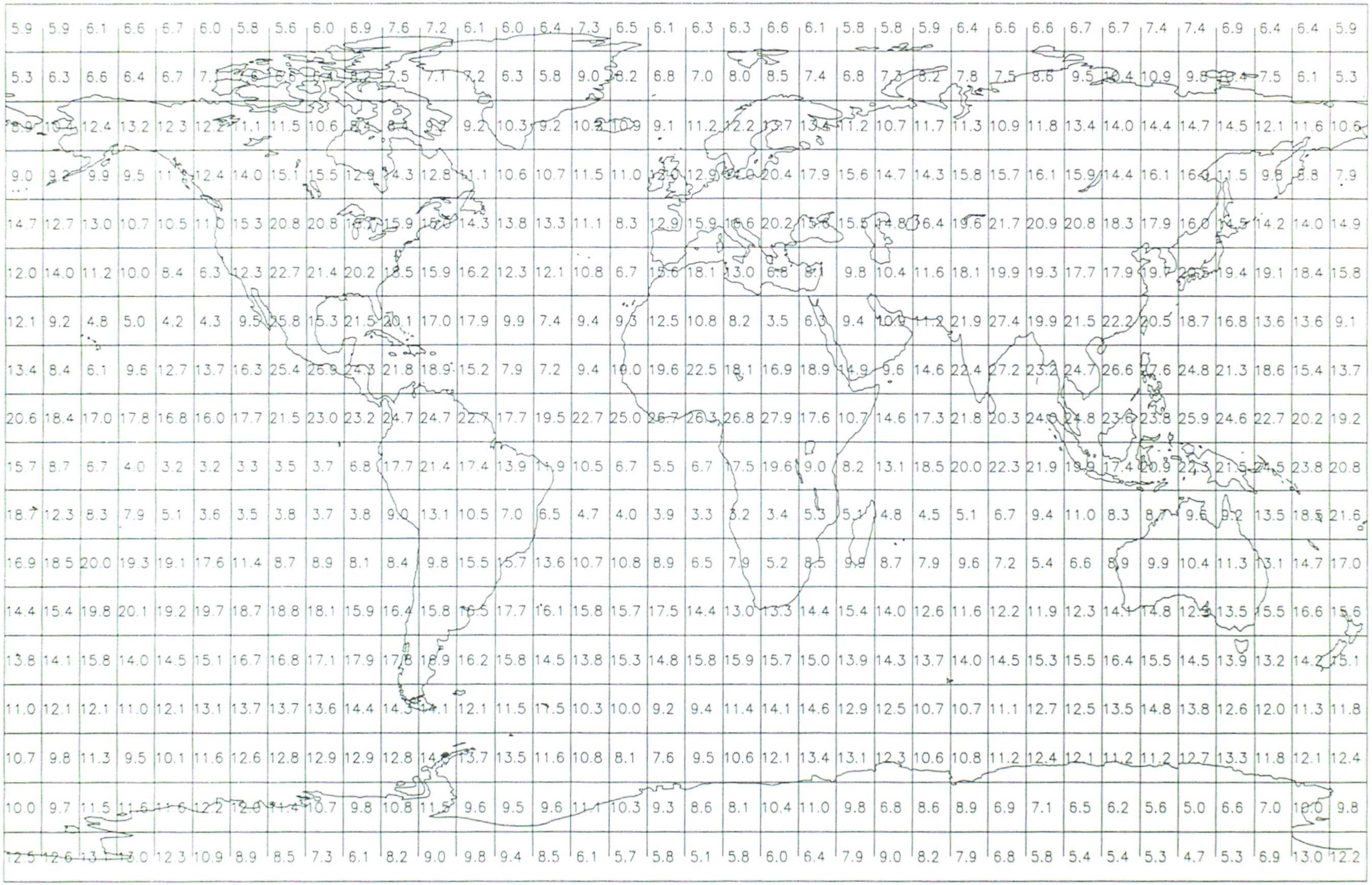
-7.9 -8.1 -8.0 -8.1 -8.0 -7.8 -7.9 -7.9 -8.3 -7.7 -6.3 -6.3 -6.6 -6.1 -4.8 -5.1 -6.7 -7.8 -8.5 -8.9 -9.1 -9.2 -9.2 -9.1 -8.8 -8.5 -9.3 -10.0 -9.6 -8.8 -9.1 -8.9 -9.0 -8.7 -8.2 -7.8
-4.2 -4.8 -5.5 -5.4 -5.5 -6.2 -6.1 -7.5 -6.2 -6.4 -5.8 -6.1 -5.6 -4.2 -3.4 -4.2 -6.8 -7.2 -8.6 -9.2 -8.5 -7.8 -7.7 -8.2 -8.5 -8.7 -8.8 -9.7 -9.4 -9.2 -8.3 -7.2 -8.5 -6.7 -5.0 -4.2
-5.8 -8.5 -12.0 -9.4 -9.8 -9.2 -9.3 -11.7 -9.9 -5.9 -6.9 -7.4 -9.6 -7.0 -7.7 [illegible] -10.6 -9.0 -11.6 -11.9 -10.1 -8.4 -7.0 -9.1 -11.3 -11.8 -13.7 -13.4 -12.5 -12.4 -11.8 -11.7 -10.5 -9.7 -6.7 -4.7
-12.6 -12.4 -12.5 -12.3 -13.9 -14.4 -14.1 -12.7 -10.7 -7.9 -9.7 -9.5 -9.8 -10.5 -11.8 -14.0 -13.3 -13.8 -11.4 -12.3 -14.4 -7.8 -6.5 -9.5 -12.6 -13.9 -13.2 -12.5 -12.2 -11.1 -12.8 -12.6 -9.0 -6.6 -8.5 -10.7
-17.2 -15.2 -13.7 -11.2 -11.7 -9.8 -12.4 -14.2 -14.2 -12.9 -11.9 -10.1 -9.7 -11.9 -13.2 -10.7 -7.7 -9.0 -11.3 -12.1 -15.3 -8.5 -7.6 -8.3 -12.7 -14.0 -12.3 -6.9 -10.7 -13.5 -14.1 -13.7 -11.1 -12.0 -14.2 -17.1
-8.8 -9.7 -7.1 -8.3 -7.1 -4.3 -4.7 -15.9 -16.1 -16.5 -12.5 -9.7 -10.5 -8.8 -7.7 -7.2 -5.7 -8.5 -12.4 -5.4 -1.6 .5 1.0 -.5 -5.3 -6.6 -5.4 -13.0 -17.0 -17.2 -17.6 [illegible] -21.0 -18.8 -17.6 -14.4
-7.3 -4.9 -3.7 -5.3 -6.6 -4.9 -5.7 -19.2 -8.2 -18.6 -15.3 -10.2 -12.7 -6.0 -4.3 -5.4 -8.8 -14.9 -10.1 -4.0 -.2 -.3 -2.6 -4.1 -7.2 -16.9 -22.0 -20.5 -22.8 -21.6 -18.4 -13.9 -10.6 -7.6 -8.1 -5.2
-7.5 -4.7 -4.1 -7.2 -8.8 -9.7 -11.2 -22.6 -27.2 -25.1 -17.4 -12.6 -9.5 -4.4 -4.6 -6.3 -16.9 -19.7 -18.0 -10.5 -7.3 -9.9 -6.7 -5.9 -11.0 -22.9 -31.1 -33.3 -28.0 -23.0 -28.9 -20.8 -15.3 -11.9 -9.3 -7.2
-13.7 -11.4 -10.6 -12.1 -10.6 -10.4 -12.8 -18.4 -20.1 -23.1 -28.0 -25.2 -21.0 -12.9 -17.6 -21.0 -26.3 -29.3 -27.8 -24.4 -28.0 -11.4 -7.3 -10.0 -13.3 -21.1 -17.5 -27.2 -26.0 -26.8 -27.9 -30.5 -26.1 -19.3 -14.6 -12.8
-7.9 -3.7 -2.6 -1.7 -1.6 -1.7 -2.0 -2.7 -3.5 -6.5 -14.8 -18.5 -11.1 -5.9 -6.3 -4.8 -3.3 -2.8 -4.2 -9.7 -11.2 -4.5 -5.9 -8.7 -12.9 -15.9 -20.0 -19.9 -14.7 -11.6 -19.5 -24.4 -20.1 -20.8 -16.9 -13.7
-12.5 -6.6 -4.3 -3.5 -2.6 -2.5 -3.0 -4.2 -5.7 -7.6 -5.2 -4.4 -4.6 -3.1 -4.9 -3.3 -2.5 -3.2 -3.1 .1 -.1 -1.5 -2.9 -3.4 -3.4 -3.9 -4.9 -5.6 -7.7 -4.3 -2.7 -3.6 -6.1 -8.9 -13.1 -16.9
-16.8 -16.8 -18.1 -15.1 -15.0 -12.5 -7.4 -6.9 -7.4 -8.2 -8.0 -2.1 -9.9 -12.1 -9.8 -8.4 -8.5 -6.4 -5.1 -1.6 .5 -2.2 -4.3 -6.3 -6.6 -6.9 -6.4 -5.4 -5.6 -1.3 -1.9 -5.4 -7.2 -8.6 -10.2 -14.7
-13.5 -15.1 -19.8 -23.0 -21.0 -22.8 -23.5 -21.6 -19.0 -16.1 -15.8 -11.3 -13.5 -17.3 -15.4 -16.4 -17.1 -17.5 -14.2 -9.8 -6.4 -8.7 -11.3 -12.8 -12.1 -9.9 -10.3 -10.3 -11.2 -10.8 -9.9 -8.4 -8.5 -13.6 -15.0 -11.8
-14.1 -15.8 -15.3 -14.8 -15.9 -15.5 -16.8 -16.1 -17.5 -19.0 -15.0 -13.1 -16.0 -16.9 -15.3 -15.2 -18.4 -18.5 -18.6 -17.8 -18.2 -15.1 -13.9 -16.0 -15.1 -15.8 -17.1 -17.6 -17.4 -18.5 -17.3 -15.0 -14.3 -13.9 -14.2 -12.5
-14.6 -14.8 -14.1 -13.1 -14.1 -15.4 -15.0 -16.5 -16.4 -17.8 -17.1 -13.8 -13.6 -13.8 -13.6 -13.6 -15.1 -14.9 -15.0 -16.0 -18.0 -17.5 -14.7 -15.1 -15.0 -14.8 -16.0 -17.0 -15.3 -15.2 -17.6 -17.5 -17.5 -17.0 -16.2 -15.9
-13.2 -13.2 -13.8 -12.6 -13.2 -12.3 -12.4 -12.5 -12.3 -10.7 -8.4 [illegible] -13.3 -10.6 -8.9 -8.0 -5.5 -6.0 -9.3 -11.2 -14.0 -14.1 -12.7 -10.4 -7.3 -8.0 -8.5 -9.7 -9.2 -8.9 -8.4 -7.4 -8.4 -10.1 -11.5 -11.7
-8.3 -10.2 -10.9 -8.2 -6.3 -4.9 -3.7 -5.7 -3.7 -1.0 -3.1 -5.4 -11.1 -9.9 -9.8 -4.2 -3.9 -1.8 -2.9 -3.3 -2.0 .9 3.9 4.6 1.9 1.3 4.1 7.5 5.9 5.9 3.8 3.3 1.6 .2 -4.0 -5.4
-12.0 -14.3 -14.9 -6.3 1.3 1.0 1.6 3.7 3.9 .0 -5.5 -9.3 -9.0 -6.6 -2.6 .8 1.6 3.0 3.8 3.7 3.1 3.3 5.3 7.2 7.1 7.7 6.0 4.8 4.0 3.9 3.4 3.3 3.0 4.7 -5.0 -10.7

ATOVS : SD O-B BRIGHTNESS TEMPERATURE DIFFERENCES(DEG C)

JUNE 1999 : HIRS8 channel (Surface)

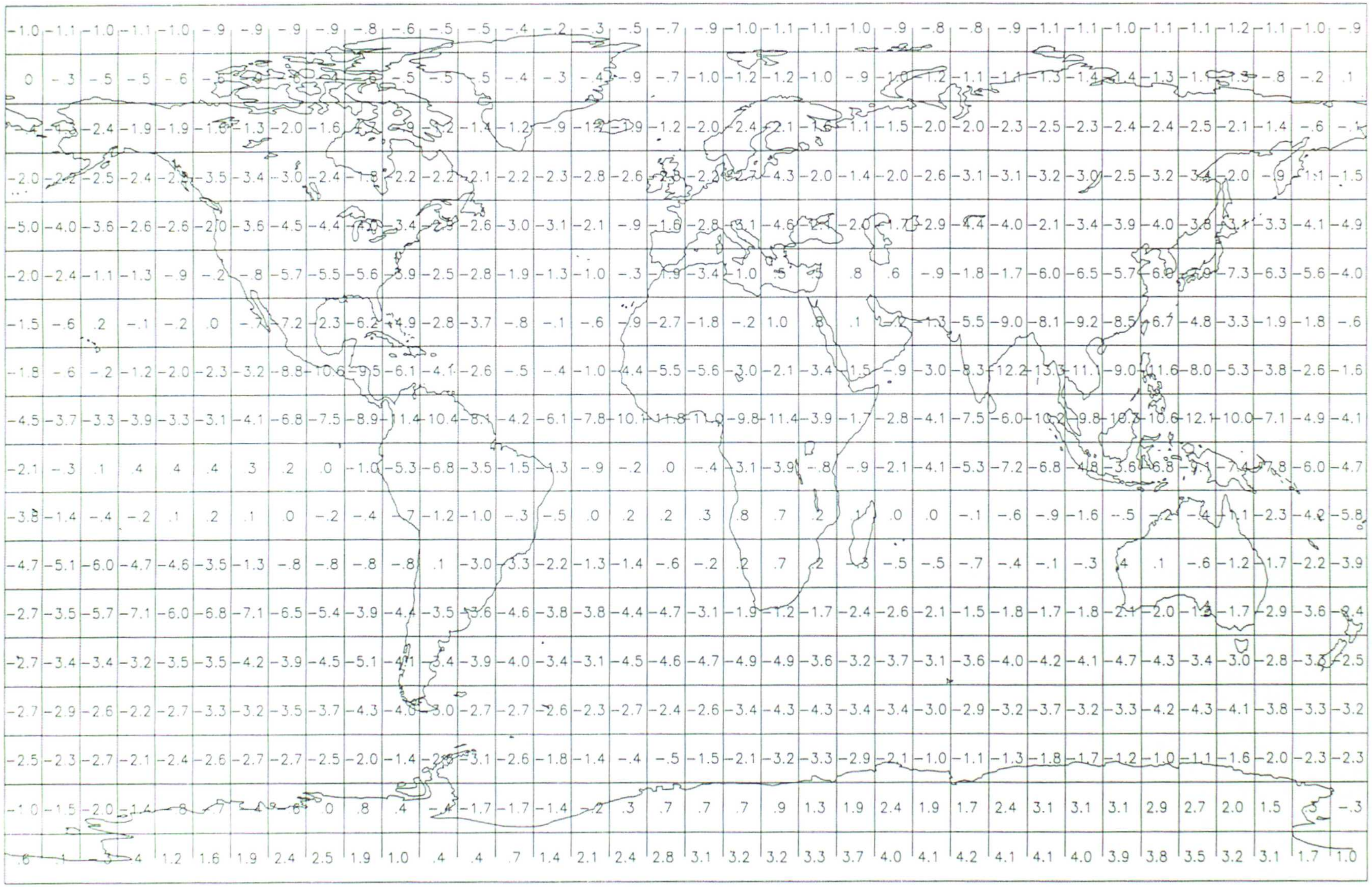
NOAA-15, USING ALL OBSERVATIONS

FIGURE 27


5.9 5.9 6.1 6.6 6.7 6.0 5.8 5.6 6.0 6.9 7.6 7.2 6.1 6.0 6.4 7.3 6.5 6.1 6.3 6.3 6.6 6.1 5.8 5.8 5.9 6.4 6.6 6.6 6.7 6.7 7.4 7.4 6.9 6.4 6.4 5.9
5.3 6.3 6.6 6.4 6.7 7.1 7.6 6.6 7.4 8.2 7.5 7.1 7.2 6.3 5.8 9.0 8.2 6.8 7.0 8.0 8.5 7.4 6.8 7.3 8.2 7.8 7.5 8.6 9.5 10.4 10.9 9.8 8.4 7.5 6.1 5.3
8.9 10.4 12.4 13.2 12.3 12.2 11.1 11.5 10.6 8.4 8.4 9.2 9.2 10.3 9.2 10.3 10.9 9.1 11.2 12.2 13.7 13.4 11.2 10.7 11.7 11.3 10.9 11.8 13.4 14.0 14.4 14.7 14.5 12.1 11.6 10.6
9.0 9.2 9.9 9.5 11.[illegible] 12.4 14.0 15.1 15.5 12.9 14.3 12.8 11.1 10.6 10.7 11.5 11.0 12.0 12.9 14.0 20.4 17.9 15.6 14.7 14.3 15.8 15.7 16.1 15.9 14.4 16.1 16.0 11.5 9.8 8.8 7.9
14.7 12.7 13.0 10.7 10.5 11.0 15.3 20.8 20.8 18.7 15.9 15.0 14.3 13.8 13.3 11.1 8.3 12.9 15.9 16.6 20.2 15.6 15.5 14.8 16.4 19.6 21.7 20.9 20.8 18.3 17.9 16.0 14.5 14.2 14.0 14.9
12.0 14.0 11.2 10.0 8.4 6.3 12.3 22.7 21.4 20.2 18.5 15.9 16.2 12.3 12.1 10.8 6.7 15.6 18.1 13.0 6.8 8.1 9.8 10.4 11.6 18.1 19.9 19.3 17.7 17.9 19.7 20.5 19.4 19.1 18.4 15.8
12.1 9.2 4.8 5.0 4.2 4.3 9.5 25.8 15.3 21.5 20.1 17.0 17.9 9.9 7.4 9.4 9.3 12.5 10.8 8.2 3.5 6.3 9.4 10.9 11.2 21.9 27.4 19.9 21.5 22.2 20.5 18.7 16.8 13.6 13.6 9.1
13.4 8.4 6.1 9.6 12.7 13.7 16.3 25.4 26.9 24.3 21.8 18.9 15.2 7.9 7.2 9.4 10.0 19.6 22.5 18.1 16.9 18.9 14.9 9.6 14.6 22.4 27.2 23.2 24.7 26.6 27.6 24.8 21.3 18.6 15.4 13.7
20.6 18.4 17.0 17.8 16.8 16.0 17.7 21.5 23.0 23.2 24.7 24.7 22.7 17.7 19.5 22.7 25.0 26.7 26.3 26.8 27.9 17.6 10.7 14.6 17.3 21.8 20.3 24.0 24.8 23.6 23.8 25.9 24.6 22.7 20.2 19.2
15.7 8.7 6.7 4.0 3.2 3.2 3.3 3.5 3.7 6.8 17.7 21.4 17.4 13.9 11.9 10.5 6.7 5.5 6.7 17.5 19.6 9.0 8.2 13.1 18.5 20.0 22.3 21.9 19.9 17.4 20.9 22.3 21.5 24.5 23.8 20.8
18.7 12.3 8.3 7.9 5.1 3.6 3.5 3.8 3.7 3.8 9.0 13.1 10.5 7.0 6.5 4.7 4.0 3.9 3.3 3.2 3.4 5.3 5.1 4.8 4.5 5.1 6.7 9.4 11.0 8.3 8.7 9.6 9.2 13.5 18.5 21.6
16.9 18.5 20.0 19.3 19.1 17.6 11.4 8.7 8.9 8.1 8.4 9.8 15.5 15.7 13.6 10.7 10.8 8.9 6.5 7.9 5.2 8.5 9.9 8.7 7.9 9.6 7.2 5.4 6.6 8.9 9.9 10.4 11.3 13.1 14.7 17.0
14.4 15.4 19.8 20.1 19.2 19.7 18.7 18.8 18.1 15.9 16.4 15.8 16.5 17.7 16.1 15.8 15.7 17.5 14.4 13.0 13.3 14.4 15.4 14.0 12.6 11.6 12.2 11.9 12.3 14.1 14.8 12.5 13.5 15.5 16.6 15.6
13.8 14.1 15.8 14.0 14.5 15.1 16.7 16.8 17.1 17.9 17.8 18.9 16.2 15.8 14.5 13.8 15.3 14.8 15.8 15.9 15.7 15.0 13.9 14.3 13.7 14.0 14.5 15.3 15.5 16.4 15.5 14.5 13.9 13.2 14.2 15.1
11.0 12.1 12.1 11.0 12.1 13.1 13.7 13.7 13.6 14.4 14.3 14.1 12.1 11.5 17.5 10.3 10.0 9.2 9.4 11.4 14.1 14.6 12.9 12.5 10.7 10.7 11.1 12.7 12.5 13.5 14.8 13.8 12.6 12.0 11.3 11.8
10.7 9.8 11.3 9.5 10.1 11.6 12.6 12.8 12.9 12.9 12.8 14.[illegible] 13.7 13.5 11.6 10.8 8.1 7.6 9.5 10.6 12.1 13.4 13.1 12.3 10.6 10.8 11.2 12.4 12.1 11.2 11.2 12.7 13.3 11.8 12.1 12.4
10.0 9.7 11.5 11.6 11.6 12.2 12.0 11.4 10.7 9.8 10.8 11.5 9.6 9.5 9.6 11.1 10.3 9.3 8.6 8.1 10.4 11.0 9.8 6.8 8.6 8.9 6.9 7.1 6.5 6.2 5.6 5.0 6.6 7.0 10.0 9.8
12.5 12.6 13.1 13.0 12.3 10.9 8.9 8.5 7.3 6.1 8.2 9.0 9.8 9.4 8.5 6.1 5.7 5.8 5.1 5.8 6.0 6.4 7.9 9.0 8.2 7.9 6.8 5.8 5.4 5.4 5.3 4.7 5.3 6.9 13.0 12.2

ATOVS : MEAN O–B BRIGHTNESS TEMPERATURE DIFFERENCES (DEG C)
JUNE 1999 : HIRS15 Channel (700 hPa)
NOAA–15, USING ALL OBSERVATIONS

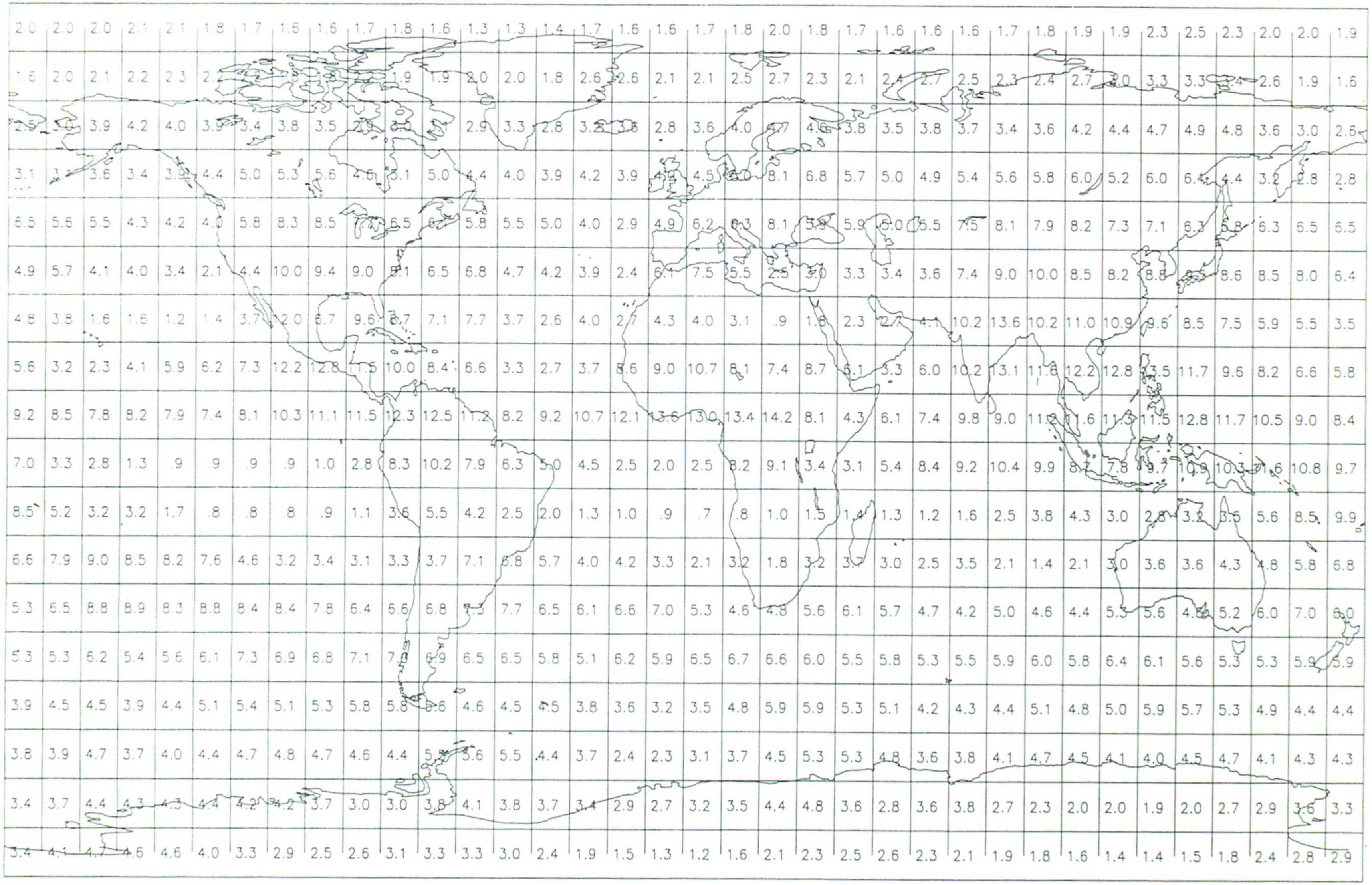
FIGURE 28



-1.0 -1.1 -1.0 -1.1 -1.0 -.9 -.9 -.9 -.9 -.8 -.6 -.5 -.5 -.4 -.2 -.3 -.5 -.7 -.9 -1.0 -1.1 -1.1 -1.0 -.9 -.8 -.8 -.9 -1.1 -1.1 -1.0 -1.1 -1.1 -1.2 -1.1 -1.0 -.9
0 -.3 -.5 -.5 -.6 -.5 -.6 -.6 -.4 -.6 -.5 -.5 -.5 -.4 -.3 -.4 -.9 -.7 -1.0 -1.2 -1.2 -1.0 -.9 -1.0 -1.2 -1.1 -1.1 -1.3 -1.4 -1.4 -1.3 -1.1 -1.3 -.8 -.2 .1
-.4 -1.3 -2.4 -1.9 -1.9 -1.6 -1.3 -2.0 -1.6 -.7 -.9 -1.2 -1.4 -1.2 -.9 -1.2 -1.9 -1.2 -2.0 -2.4 -2.1 -1.6 -1.1 -1.5 -2.0 -2.0 -2.3 -2.5 -2.3 -2.4 -2.4 -2.5 -2.1 -1.4 -.6 -.1
-2.0 -2.2 -2.5 -2.4 -2.3 -3.5 -3.4 -3.0 -2.4 -1.8 -2.2 -2.2 -2.1 -2.2 -2.3 -2.8 -2.6 -2.3 -2.2 -2.7 -4.3 -2.0 -1.4 -2.0 -2.6 -3.1 -3.1 -3.2 -3.0 -2.5 -3.2 -3.4 -2.0 -.9 -1.1 -1.5
-5.0 -4.0 -3.6 -2.6 -2.6 -2.0 -3.6 -4.5 -4.4 -4.0 -3.4 -2.9 -2.6 -3.0 -3.1 -2.1 -.9 -1.6 -2.8 -3.1 -4.6 -2.1 -2.0 -1.7 -2.9 -4.4 -4.0 -2.1 -3.4 -3.9 -4.0 -3.8 -3.1 -3.3 -4.1 -4.9
-2.0 -2.4 -1.1 -1.3 -.9 -.2 -.8 -5.7 -5.5 -5.6 -3.9 -2.5 -2.8 -1.9 -1.3 -1.0 -.3 -1.9 -3.4 -1.0 .5 .5 .8 .6 -.9 -1.8 -1.7 -6.0 -6.5 -5.7 -6.0 -7.0 -7.3 -6.3 -5.6 -4.0
-1.5 -.6 .2 -.1 -.2 .0 -.7 -7.2 -2.3 -6.2 -4.9 -2.8 -3.7 -.8 -.1 -.6 -.9 -2.7 -1.8 -.2 1.0 .8 .1 -.2 -1.3 -5.5 -9.0 -8.1 -9.2 -8.5 -6.7 -4.8 -3.3 -1.9 -1.8 -.6
-1.8 -.6 -.2 -1.2 -2.0 -2.3 -3.2 -8.8 -10.6 -9.5 -6.1 -4.1 -2.6 -.5 -.4 -1.0 -4.4 -5.5 -5.6 -3.0 -2.1 -3.4 -1.5 -.9 -3.0 -8.3 -12.2 -13.3 -11.1 -9.0 -11.6 -8.0 -5.3 -3.8 -2.6 -1.6
-4.5 -3.7 -3.3 -3.9 -3.3 -3.1 -4.1 -6.8 -7.5 -8.9 -11.4 -10.4 -8.1 -4.2 -6.1 -7.8 -10.1 -11.8 -11.0 -9.8 -11.4 -3.9 -1.7 -2.8 -4.1 -7.5 -6.0 -10.2 -9.8 -10.3 -10.6 -12.1 -10.0 -7.1 -4.9 -4.1
-2.1 -.3 .1 .4 4 .4 .3 .2 .0 -1.0 -5.3 -6.8 -3.5 -1.5 -1.3 -.9 -.2 .0 -.4 -3.1 -3.9 -.8 -.9 -2.1 -4.1 -5.3 -7.2 -6.8 -4.8 -3.6 -6.8 -9.1 -7.4 -7.8 -6.0 -4.7
-3.8 -1.4 -.4 -.2 .1 .2 .1 .0 -.2 -.4 -.7 -1.2 -1.0 -.3 -.5 .0 .2 .2 .3 .8 .7 .2 .1 .0 .0 -.1 -.6 -.9 -1.6 -.5 -.2 -.4 -1.1 -2.3 -4.2 -5.8
-4.7 -5.1 -6.0 -4.7 -4.6 -3.5 -1.3 -.8 -.8 -.8 -.8 .1 -3.0 -3.3 -2.2 -1.3 -1.4 -.6 -.2 .2 .7 .2 -.3 -.5 -.5 -.7 -.4 -.1 -.3 .4 .1 -.6 -1.2 -1.7 -2.2 -3.9
-2.7 -3.5 -5.7 -7.1 -6.0 -6.8 -7.1 -6.5 -5.4 -3.9 -4.4 -3.5 -3.6 -4.6 -3.8 -3.8 -4.4 -4.7 -3.1 -1.9 -1.2 -1.7 -2.4 -2.6 -2.1 -1.5 -1.8 -1.7 -1.8 -2.1 -2.0 -1.3 -1.7 -2.9 -3.6 -2.4
-2.7 -3.4 -3.4 -3.2 -3.5 -3.5 -4.2 -3.9 -4.5 -5.1 -4.1 -3.4 -3.9 -4.0 -3.4 -3.1 -4.5 -4.6 -4.7 -4.9 -4.9 -3.6 -3.2 -3.7 -3.1 -3.6 -4.0 -4.2 -4.1 -4.7 -4.3 -3.4 -3.0 -2.8 -3.3 -2.5
-2.7 -2.9 -2.6 -2.2 -2.7 -3.3 -3.2 -3.5 -3.7 -4.3 -4.0 -3.0 -2.7 -2.7 -2.6 -2.3 -2.7 -2.4 -2.6 -3.4 -4.3 -4.3 -3.4 -3.4 -3.0 -2.9 -3.2 -3.7 -3.2 -3.3 -4.2 -4.3 -4.1 -3.8 -3.3 -3.2
-2.5 -2.3 -2.7 -2.1 -2.4 -2.6 -2.7 -2.7 -2.5 -2.0 -1.4 -2.8 -3.1 -2.6 -1.8 -1.4 -.4 -.5 -1.5 -2.1 -3.2 -3.3 -2.9 -2.1 -1.0 -1.1 -1.3 -1.8 -1.7 -1.2 -1.0 -1.1 -1.6 -2.0 -2.3 -2.3
-1.0 -1.5 -2.0 -1.4 -.8 -.7 -.4 -.6 .0 .8 .4 -.4 -1.7 -1.7 -1.4 -.2 .3 .7 .7 .7 .9 1.3 1.9 2.4 1.9 1.7 2.4 3.1 3.1 3.1 2.9 2.7 2.0 1.5 .5 -.3
.6 .1 .3 .4 1.2 1.6 1.9 2.4 2.5 1.9 1.0 .4 .4 .7 1.4 2.1 2.4 2.8 3.1 3.2 3.2 3.3 3.7 4.0 4.1 4.2 4.1 4.1 4.0 3.9 3.8 3.5 3.2 3.1 1.7 1.0

ATOVS : SD O-B BRIGHTNESS TEMPERATURE DIFFERENCES(DEG C)
JUNE 1999 : HIRS15 channel (700 hPa)
NOAA-15, USING ALL OBSERVATIONS

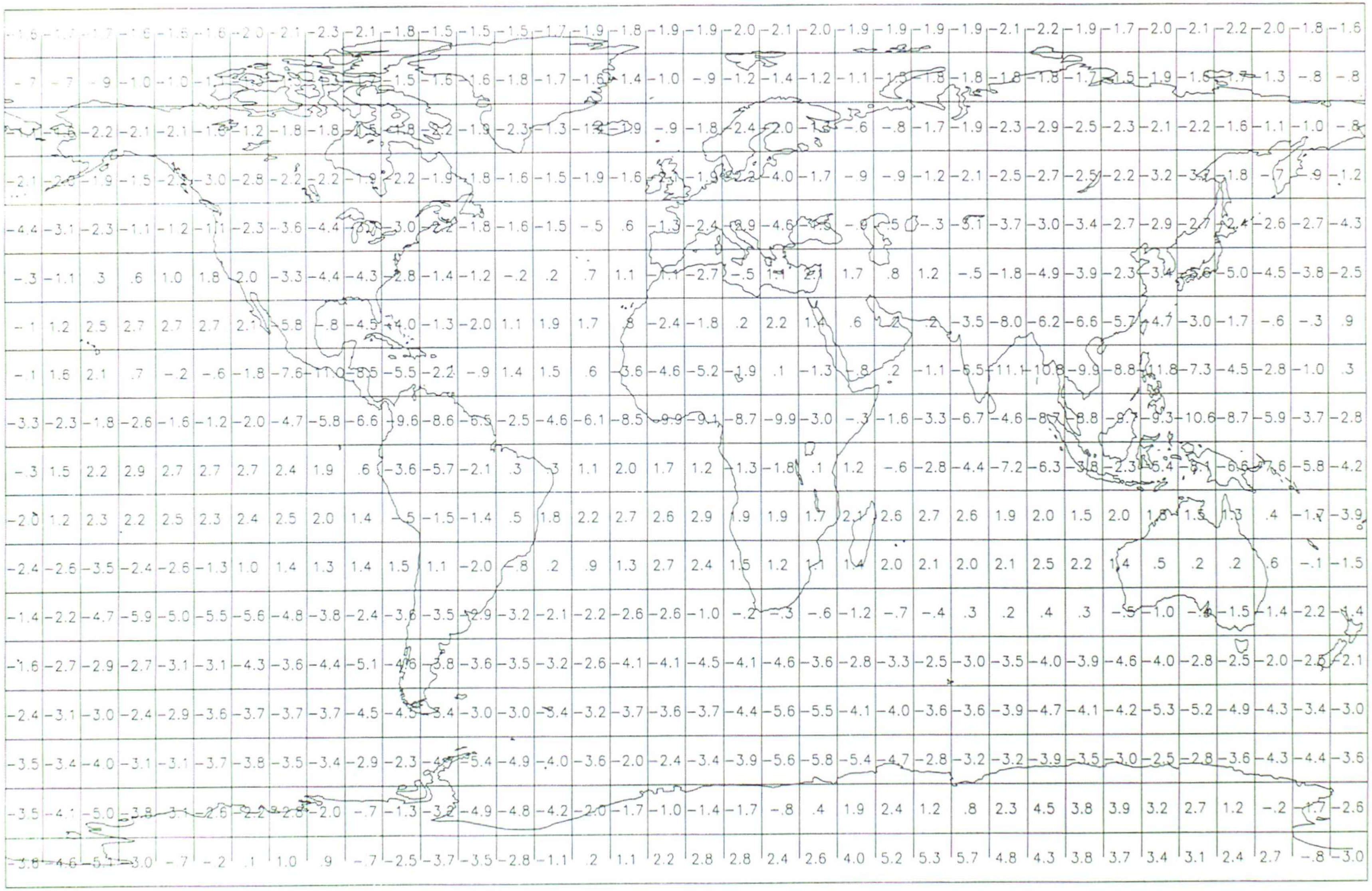
FIGURE 29



2.0	2.0	2.0	2.1	2.1	1.8	1.7	1.6	1.6	1.7	1.8	1.6	1.3	1.3	1.4	1.7	1.6	1.6	1.7	1.8	2.0	1.8	1.7	1.6	1.6	1.6	1.7	1.8	1.9	1.9	2.3	2.5	2.3	2.0	2.0	1.9
1.6	2.0	2.1	2.2	2.3	2.2	[illegible]	[illegible]	[illegible]	[illegible]	1.9	1.9	2.0	2.0	1.8	2.6	2.6	2.1	2.1	2.5	2.7	2.3	2.1	2.4	2.7	2.5	2.3	2.4	2.7	2.0	3.3	3.3	3.4	2.6	1.9	1.6
2.5	3.0	3.9	4.2	4.0	3.9	3.4	3.8	3.5	2.9	3.0	3.1	2.9	3.3	2.8	3.3	3.5	2.8	3.6	4.0	4.7	4.6	3.8	3.5	3.8	3.7	3.4	3.6	4.2	4.4	4.7	4.9	4.8	3.6	3.0	2.6
3.1	3.1	3.6	3.4	3.9	4.4	5.0	5.3	5.6	4.6	3.1	5.0	4.4	4.0	3.9	4.2	3.9	4.9	4.5	5.0	8.1	6.8	5.7	5.0	4.9	5.4	5.6	5.8	6.0	5.2	6.0	6.4	4.4	3.2	2.8	2.8
6.5	5.6	5.5	4.3	4.2	4.0	5.8	8.3	8.5	[illegible]	6.5	[illegible]	5.8	5.5	5.0	4.0	2.9	4.9	6.2	6.3	8.1	5.9	5.9	6.0	5.5	7.5	8.1	7.9	8.2	7.3	7.1	6.3	5.8	6.3	6.5	6.5
4.9	5.7	4.1	4.0	3.4	2.1	4.4	10.0	9.4	9.0	8.1	6.5	6.8	4.7	4.2	3.9	2.4	6.1	7.5	5.5	2.5	3.0	3.3	3.4	3.6	7.4	9.0	10.0	8.5	8.2	8.8	8.5	8.6	8.5	8.0	6.4
4.8	3.8	1.6	1.6	1.2	1.4	3.7	12.0	6.7	9.6	8.7	7.1	7.7	3.7	2.6	4.0	2.7	4.3	4.0	3.1	.9	1.8	2.3	2.7	4.1	10.2	13.6	10.2	11.0	10.9	9.6	8.5	7.5	5.9	5.5	3.5
5.6	3.2	2.3	4.1	5.9	6.2	7.3	12.2	12.8	11.5	10.0	8.4	6.6	3.3	2.7	3.7	8.6	9.0	10.7	8.1	7.4	8.7	5.1	3.3	6.0	10.2	13.1	11.6	12.2	12.8	13.5	11.7	9.6	8.2	6.6	5.8
9.2	8.5	7.8	8.2	7.9	7.4	8.1	10.3	11.1	11.5	12.3	12.5	11.2	8.2	9.2	10.7	12.1	13.6	13.0	13.4	14.2	8.1	4.3	6.1	7.4	9.8	9.0	11.2	11.6	11.3	11.5	12.8	11.7	10.5	9.0	8.4
7.0	3.3	2.8	1.3	.9	.9	.9	.9	1.0	2.8	8.3	10.2	7.9	6.3	5.0	4.5	2.5	2.0	2.5	8.2	9.1	3.4	3.1	5.4	8.4	9.2	10.4	9.9	8.7	7.8	9.7	10.9	10.3	11.6	10.8	9.7
8.5	5.2	3.2	3.2	1.7	.8	.8	.8	.9	1.1	3.6	5.5	4.2	2.5	2.0	1.3	1.0	.9	.7	.8	1.0	1.5	1.4	1.3	1.2	1.6	2.5	3.8	4.3	3.0	2.8	3.2	3.5	5.6	8.5	9.9
6.6	7.9	9.0	8.5	8.2	7.6	4.6	3.2	3.4	3.1	3.3	3.7	7.1	6.8	5.7	4.0	4.2	3.3	2.1	3.2	1.8	3.2	3.7	3.0	2.5	3.5	2.1	1.4	2.1	3.0	3.6	3.6	4.3	4.8	5.8	6.8
5.3	6.5	8.8	8.9	8.3	8.8	8.4	8.4	7.8	6.4	6.6	6.8	7.3	7.7	6.5	6.1	6.6	7.0	5.3	4.6	4.8	5.6	6.1	5.7	4.7	4.2	5.0	4.6	4.4	5.3	5.6	4.8	5.2	6.0	7.0	6.0
5.3	5.3	6.2	5.4	5.6	6.1	7.3	6.9	6.8	7.1	7.0	6.9	6.5	6.5	5.8	5.1	6.2	5.9	6.5	6.7	6.6	6.0	5.5	5.8	5.3	5.5	5.9	6.0	5.8	6.4	6.1	5.6	5.3	5.3	5.9	5.9
3.9	4.5	4.5	3.9	4.4	5.1	5.4	5.1	5.3	5.8	5.8	5.6	4.6	4.5	4.5	3.8	3.6	3.2	3.5	4.8	5.9	5.9	5.3	5.1	4.2	4.3	4.4	5.1	4.8	5.0	5.9	5.7	5.3	4.9	4.4	4.4
3.8	3.9	4.7	3.7	4.0	4.4	4.7	4.8	4.7	4.6	4.4	[illegible]	5.6	5.5	4.4	3.7	2.4	2.3	3.1	3.7	4.5	5.3	5.3	4.8	3.6	3.8	4.1	4.7	4.5	4.1	4.0	4.5	4.7	4.1	4.3	4.3
3.4	3.7	4.4	4.3	4.3	4.4	4.2	4.2	3.7	3.0	3.0	3.8	4.1	3.8	3.7	3.4	2.9	2.7	3.2	3.5	4.4	4.8	3.6	2.8	3.6	3.8	2.7	2.3	2.0	2.0	1.9	2.0	2.7	2.9	3.6	3.3
3.4	4.1	4.7	4.6	4.6	4.0	3.3	2.9	2.5	2.6	3.1	3.3	3.3	3.0	2.4	1.9	1.5	1.3	1.2	1.6	2.1	2.3	2.5	2.6	2.3	2.1	1.9	1.8	1.6	1.4	1.4	1.5	1.8	2.4	2.8	2.9

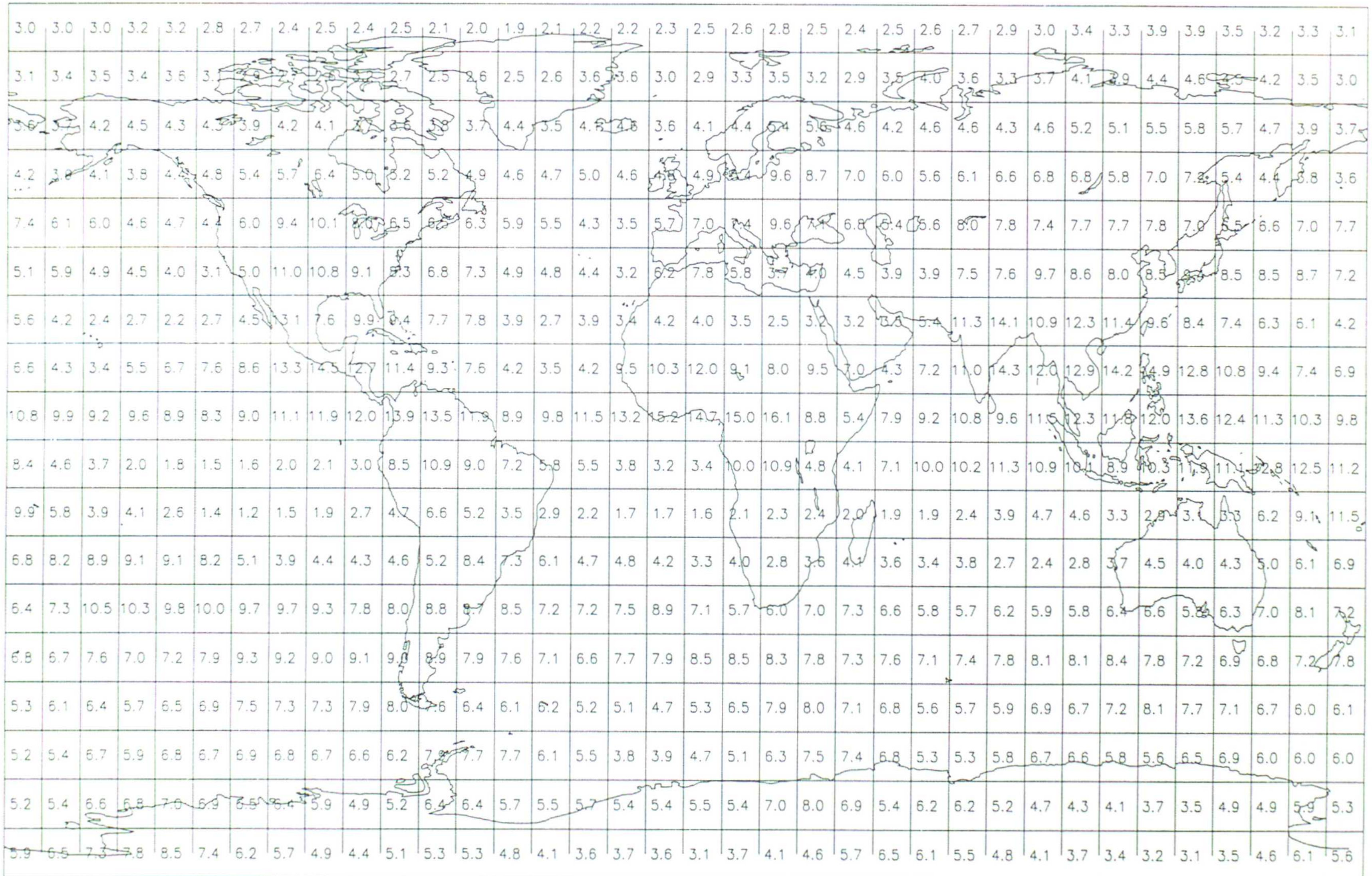
ATOVS : MEAN O–B BRIGHTNESS TEMPERATURE DIFFERENCES (DEG C)
JUNE 1999 : HIRS11 Channel (500–700 hPa)
NOAA–15, USING ALL OBSERVATIONS

FIGURE 30


-1.5 -1.7 -1.7 -1.6 -1.6 -1.6 -2.0 -2.1 -2.3 -2.1 -1.8 -1.5 -1.5 -1.5 -1.7 -1.9 -1.8 -1.9 -1.9 -2.0 -2.1 -2.0 -1.9 -1.9 -1.9 -1.9 -2.1 -2.2 -1.9 -1.7 -2.0 -2.1 -2.2 -2.0 -1.8 -1.6
-.7 -.7 -.9 -1.0 -1.0 -1.1 [illegible] [illegible] [illegible] [illegible] -1.5 -1.6 -1.6 -1.8 -1.7 -1.6 -1.4 -1.0 -.9 -1.2 -1.4 -1.2 -1.1 -1.5 -1.8 -1.8 -1.8 -1.8 -1.7 -1.5 -1.9 -1.6 -1.7 -1.3 -.8 -.8
-1.1 -1.6 -2.2 -2.1 -2.1 -1.6 -1.2 -1.8 -1.8 -1.5 -1.8 -2.2 -1.9 -2.3 -1.3 -1.3 -1.9 -.9 -1.8 -2.4 -2.0 -1.5 -.6 -.8 -1.7 -1.9 -2.3 -2.9 -2.5 -2.3 -2.1 -2.2 -1.6 -1.1 -1.0 -.8
-2.1 -2.0 -1.9 -1.5 -2.3 -3.0 -2.8 -2.2 -2.2 -1.9 -2.2 -1.9 -1.8 -1.6 -1.5 -1.9 -1.6 -2.1 -1.9 -2.2 -4.0 -1.7 -.9 -.9 -1.2 -2.1 -2.5 -2.7 -2.5 -2.2 -3.2 -3.7 -1.8 -.7 -.9 -1.2
-4.4 -3.1 -2.3 -1.1 -1.2 -1.1 -2.3 -3.6 -4.4 -3.2 -3.0 -2.2 -1.8 -1.6 -1.5 -.5 .6 -1.3 -2.4 -3.9 -4.6 -1.5 -.9 -.5 -.3 -3.1 -3.7 -3.0 -3.4 -2.7 -2.9 -2.7 -2.4 -2.6 -2.7 -4.3
-.3 -1.1 .3 .6 1.0 1.8 2.0 -3.3 -4.4 -4.3 -2.8 -1.4 -1.2 -.2 .2 .7 1.1 -1.1 -2.7 -.5 1.1 2.1 1.7 .8 1.2 -.5 -1.8 -4.9 -3.9 -2.3 -3.4 -5.6 -5.0 -4.5 -3.8 -2.5
-.1 1.2 2.5 2.7 2.7 2.7 2.1 -5.8 -.8 -4.5 -4.0 -1.3 -2.0 1.1 1.9 1.7 .8 -2.4 -1.8 .2 2.2 1.4 .6 .2 .2 -3.5 -8.0 -6.2 -6.6 -5.7 -4.7 -3.0 -1.7 -.6 -.3 .9
-.1 1.6 2.1 .7 -.2 -.6 -1.8 -7.6 -11.0 -8.5 -5.5 -2.2 -.9 1.4 1.5 .6 -3.6 -4.6 -5.2 -1.9 .1 -1.3 -.8 .2 -1.1 -6.5 -11.1 -10.8 -9.9 -8.8 -11.8 -7.3 -4.5 -2.8 -1.0 .3
-3.3 -2.3 -1.8 -2.6 -1.6 -1.2 -2.0 -4.7 -5.8 -6.6 -9.6 -8.6 -6.5 -2.5 -4.6 -6.1 -8.5 -9.9 -9.1 -8.7 -9.9 -3.0 -.3 -1.6 -3.3 -6.7 -4.6 -8.7 -8.8 -9.7 -9.3 -10.6 -8.7 -5.9 -3.7 -2.8
-.3 1.5 2.2 2.9 2.7 2.7 2.7 2.4 1.9 .6 -3.6 -5.7 -2.1 .3 .3 1.1 2.0 1.7 1.2 -1.3 -1.8 .1 1.2 -.6 -2.8 -4.4 -7.2 -6.3 -3.8 -2.3 -5.4 -8.1 -6.6 -7.6 -5.8 -4.2
-2.0 1.2 2.3 2.2 2.5 2.3 2.4 2.5 2.0 1.4 -.5 -1.5 -1.4 .5 1.8 2.2 2.7 2.6 2.9 1.9 1.9 1.7 2.1 2.6 2.7 2.6 1.9 2.0 1.5 2.0 1.8 1.5 1.3 .4 -1.7 -3.9
-2.4 -2.6 -3.5 -2.4 -2.6 -1.3 1.0 1.4 1.3 1.4 1.5 1.1 -2.0 -.8 .2 .9 1.3 2.7 2.4 1.5 1.2 1.1 1.4 2.0 2.1 2.0 2.1 2.5 2.2 1.4 .5 .2 .2 .6 -.1 -1.5
-1.4 -2.2 -4.7 -5.9 -5.0 -5.5 -5.6 -4.8 -3.8 -2.4 -3.6 -3.5 -2.9 -3.2 -2.1 -2.2 -2.6 -2.6 -1.0 -.2 -.3 -.6 -1.2 -.7 -.4 .3 .2 .4 .3 -.5 -1.0 -.4 -1.5 -1.4 -2.2 -1.4
-1.6 -2.7 -2.9 -2.7 -3.1 -3.1 -4.3 -3.6 -4.4 -5.1 -4.6 -3.8 -3.6 -3.5 -3.2 -2.6 -4.1 -4.1 -4.5 -4.1 -4.6 -3.6 -2.8 -3.3 -2.5 -3.0 -3.5 -4.0 -3.9 -4.6 -4.0 -2.8 -2.5 -2.0 -2.5 -2.1
-2.4 -3.1 -3.0 -2.4 -2.9 -3.6 -3.7 -3.7 -3.7 -4.5 -4.5 -3.4 -3.0 -3.0 -3.4 -3.2 -3.7 -3.6 -3.7 -4.4 -5.6 -5.5 -4.1 -4.0 -3.6 -3.6 -3.9 -4.7 -4.1 -4.2 -5.3 -5.2 -4.9 -4.3 -3.4 -3.0
-3.5 -3.4 -4.0 -3.1 -3.1 -3.7 -3.8 -3.5 -3.4 -2.9 -2.3 [illegible] -5.4 -4.9 -4.0 -3.6 -2.0 -2.4 -3.4 -3.9 -5.6 -5.8 -5.4 -4.7 -2.8 -3.2 -3.2 -3.9 -3.5 -3.0 -2.5 -2.8 -3.6 -4.3 -4.4 -3.6
-3.5 -4.1 -5.0 -3.8 -3.1 -2.6 -2.2 -2.8 -2.0 -.7 -1.3 -3.2 -4.9 -4.8 -4.2 -2.0 -1.7 -1.0 -1.4 -1.7 -.8 .4 1.9 2.4 1.2 .8 2.3 4.5 3.8 3.9 3.2 2.7 1.2 -.2 -1.7 -2.6
-3.8 -4.6 -5.1 -3.0 -.7 -.2 .1 1.0 .9 -.7 -2.5 -3.7 -3.5 -2.8 -1.1 .2 1.1 2.2 2.8 2.8 2.4 2.6 4.0 5.2 5.3 5.7 4.8 4.3 3.8 3.7 3.4 3.1 2.4 2.7 -.8 -3.0

ATOVS : SD O-B BRIGHTNESS TEMPERATURE DIFFERENCES(DEG C)
JUNE 1999 : HIRS11 channel (500-700 hPa)
NOAA-15, USING ALL OBSERVATIONS

FIGURE 31

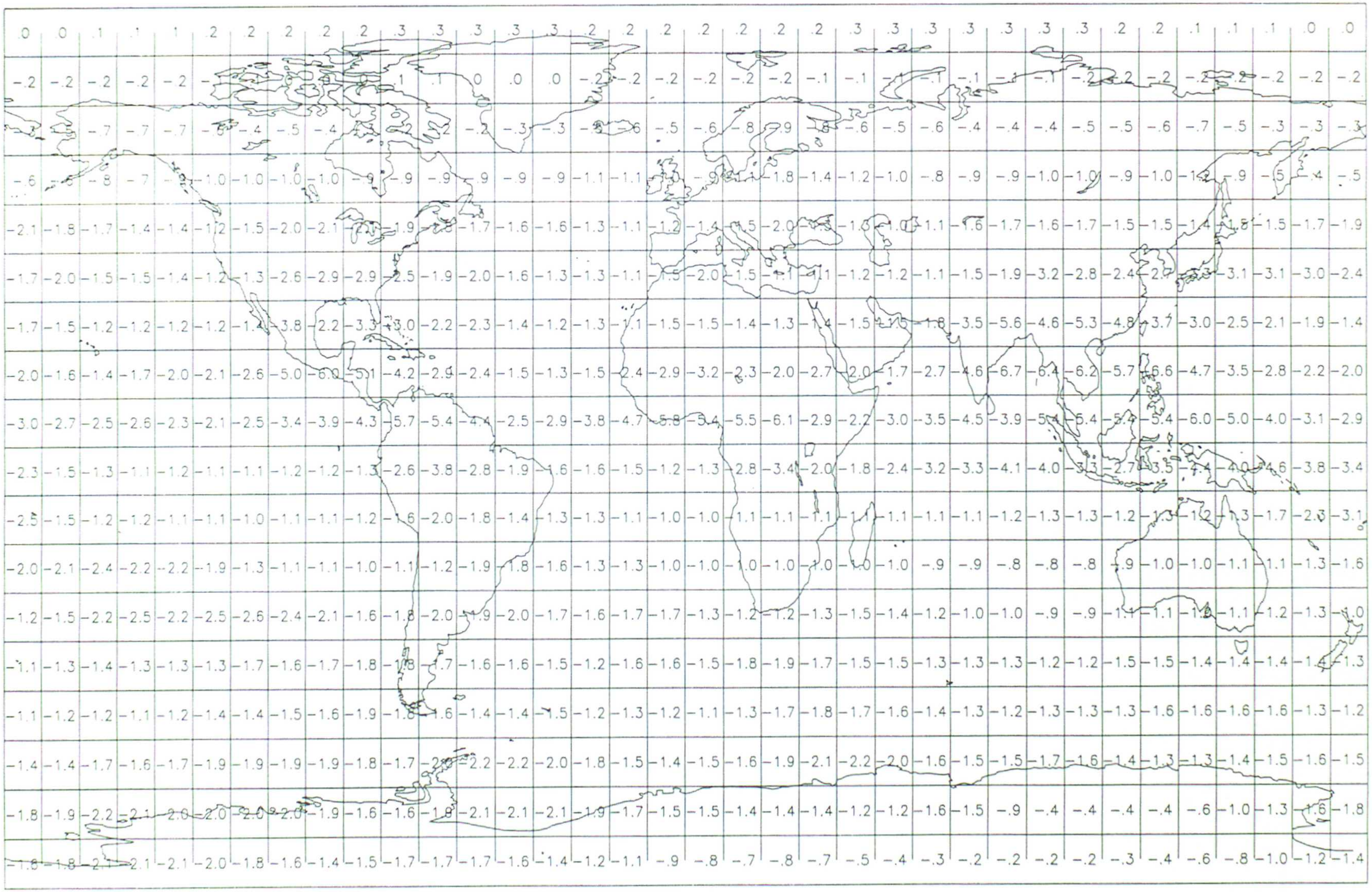

3.0 3.0 3.0 3.2 3.2 2.8 2.7 2.4 2.5 2.4 2.5 2.1 2.0 1.9 2.1 2.2 2.2 2.3 2.5 2.6 2.8 2.5 2.4 2.5 2.6 2.7 2.9 3.0 3.4 3.3 3.9 3.9 3.5 3.2 3.3 3.1
3.1 3.4 3.5 3.4 3.6 [illegible] [illegible] [illegible] [illegible] [illegible] 2.7 2.5 2.6 2.5 2.6 3.6 3.6 3.0 2.9 3.3 3.5 3.2 2.9 3.5 4.0 3.6 3.3 3.7 4.1 3.9 4.4 4.6 4.5 4.2 3.5 3.0
3.6 3.7 4.2 4.5 4.3 4.3 3.9 4.2 4.1 3.7 3.6 3.8 3.7 4.4 3.5 [illegible] 4.6 3.6 4.1 4.4 5.4 5.6 4.6 4.2 4.6 4.6 4.3 4.6 5.2 5.1 5.5 5.8 5.7 4.7 3.9 3.7
4.2 3.8 4.1 3.8 4.4 4.8 5.4 5.7 6.4 5.0 3.2 5.2 4.9 4.6 4.7 5.0 4.6 4.8 4.9 5.4 9.6 8.7 7.0 6.0 5.6 6.1 6.6 6.8 6.8 5.8 7.0 7.2 5.4 4.4 3.8 3.6
7.4 6.1 6.0 4.6 4.7 4.4 6.0 9.4 10.1 8.0 6.5 [illegible] 6.3 5.9 5.5 4.3 3.5 5.7 7.0 7.4 9.6 7.1 6.8 5.4 5.6 8.0 7.8 7.4 7.7 7.7 7.8 7.0 5.5 6.6 7.0 7.7
5.1 5.9 4.9 4.5 4.0 3.1 5.0 11.0 10.8 9.1 8.3 6.8 7.3 4.9 4.8 4.4 3.2 6.2 7.8 5.8 3.7 4.0 4.5 3.9 3.9 7.5 7.6 9.7 8.6 8.0 8.5 [illegible] 8.5 8.5 8.7 7.2
5.6 4.2 2.4 2.7 2.2 2.7 4.5 13.1 7.6 9.9 9.4 7.7 7.8 3.9 2.7 3.9 3.4 4.2 4.0 3.5 2.5 3.2 3.2 3.5 5.4 11.3 14.1 10.9 12.3 11.4 9.6 8.4 7.4 6.3 6.1 4.2
6.6 4.3 3.4 5.5 6.7 7.6 8.6 13.3 14.5 12.7 11.4 9.3 7.6 4.2 3.5 4.2 9.5 10.3 12.0 9.1 8.0 9.5 7.0 4.3 7.2 11.0 14.3 12.0 12.9 14.2 14.9 12.8 10.8 9.4 7.4 6.9
10.8 9.9 9.2 9.6 8.9 8.3 9.0 11.1 11.9 12.0 13.9 13.5 11.9 8.9 9.8 11.5 13.2 15.2 14.7 15.0 16.1 8.8 5.4 7.9 9.2 10.8 9.6 11.5 12.3 11.8 12.0 13.6 12.4 11.3 10.3 9.8
8.4 4.6 3.7 2.0 1.8 1.5 1.6 2.0 2.1 3.0 8.5 10.9 9.0 7.2 5.8 5.5 3.8 3.2 3.4 10.0 10.9 4.8 4.1 7.1 10.0 10.2 11.3 10.9 10.1 8.9 10.3 11.9 11.1 12.8 12.5 11.2
9.9 5.8 3.9 4.1 2.6 1.4 1.2 1.5 1.9 2.7 4.7 6.6 5.2 3.5 2.9 2.2 1.7 1.7 1.6 2.1 2.3 2.4 2.0 1.9 1.9 2.4 3.9 4.7 4.6 3.3 2.9 3.1 3.3 6.2 9.1 11.5
6.8 8.2 8.9 9.1 9.1 8.2 5.1 3.9 4.4 4.3 4.6 5.2 8.4 7.3 6.1 4.7 4.8 4.2 3.3 4.0 2.8 3.6 4.1 3.6 3.4 3.8 2.7 2.4 2.8 3.7 4.5 4.0 4.3 5.0 6.1 6.9
6.4 7.3 10.5 10.3 9.8 10.0 9.7 9.7 9.3 7.8 8.0 8.8 8.7 8.5 7.2 7.2 7.5 8.9 7.1 5.7 6.0 7.0 7.3 6.6 5.8 5.7 6.2 5.9 5.8 6.4 5.6 5.8 6.3 7.0 8.1 7.2
6.8 6.7 7.6 7.0 7.2 7.9 9.3 9.2 9.0 9.1 9.0 8.9 7.9 7.6 7.1 6.6 7.7 7.9 8.5 8.5 8.3 7.8 7.3 7.6 7.1 7.4 7.8 8.1 8.1 8.4 7.8 7.2 6.9 6.8 7.2 7.8
5.3 6.1 6.4 5.7 6.5 6.9 7.5 7.3 7.3 7.9 8.0 7.6 6.4 6.1 6.2 5.2 5.1 4.7 5.3 6.5 7.9 8.0 7.1 6.8 5.6 5.7 5.9 6.9 6.7 7.2 8.1 7.7 7.1 6.7 6.0 6.1
5.2 5.4 6.7 5.9 6.8 6.7 6.9 6.8 6.7 6.6 6.2 7.8 7.7 7.7 6.1 5.5 3.8 3.9 4.7 5.1 6.3 7.5 7.4 6.8 5.3 5.3 5.8 6.7 6.6 5.8 5.6 6.5 6.9 6.0 6.0 6.0
5.2 5.4 6.6 6.8 7.0 6.9 6.5 6.4 5.9 4.9 5.2 6.4 6.4 5.7 5.5 5.7 5.4 5.4 5.5 5.4 7.0 8.0 6.9 5.4 6.2 6.2 5.2 4.7 4.3 4.1 3.7 3.5 4.9 4.9 5.9 5.3
5.9 6.5 7.3 7.8 8.5 7.4 6.2 5.7 4.9 4.4 5.1 5.3 5.3 4.8 4.1 3.6 3.7 3.6 3.1 3.7 4.1 4.6 5.7 6.5 6.1 5.5 4.8 4.1 3.7 3.4 3.2 3.1 3.5 4.6 6.1 5.6

ATOVS : MEAN O–B BRIGHTNESS TEMPERATURE DIFFERENCES (DEG C)

JUNE 1999 : HIRS4 channel (400 hPa)

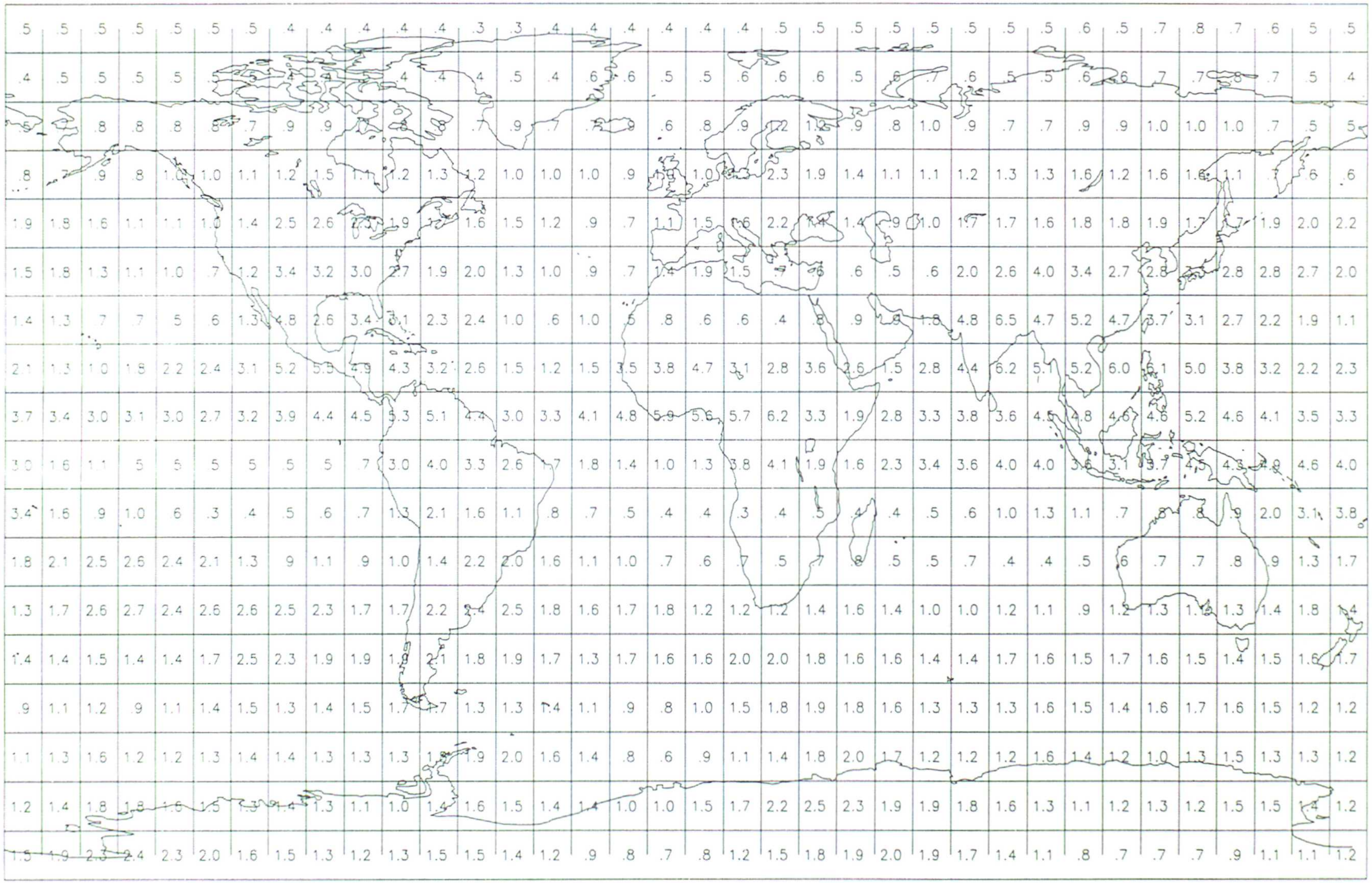
NOAA–15, USING ALL OBSERVATIONS

FIGURE 32



ATOVS : SD O-B BRIGHTNESS TEMPERATURE DIFFERENCES(DEG C)
JUNE 1999 : HIRS4 channel (400 hPa)
NOAA-15, USING ALL OBSERVATIONS

FIGURE 33

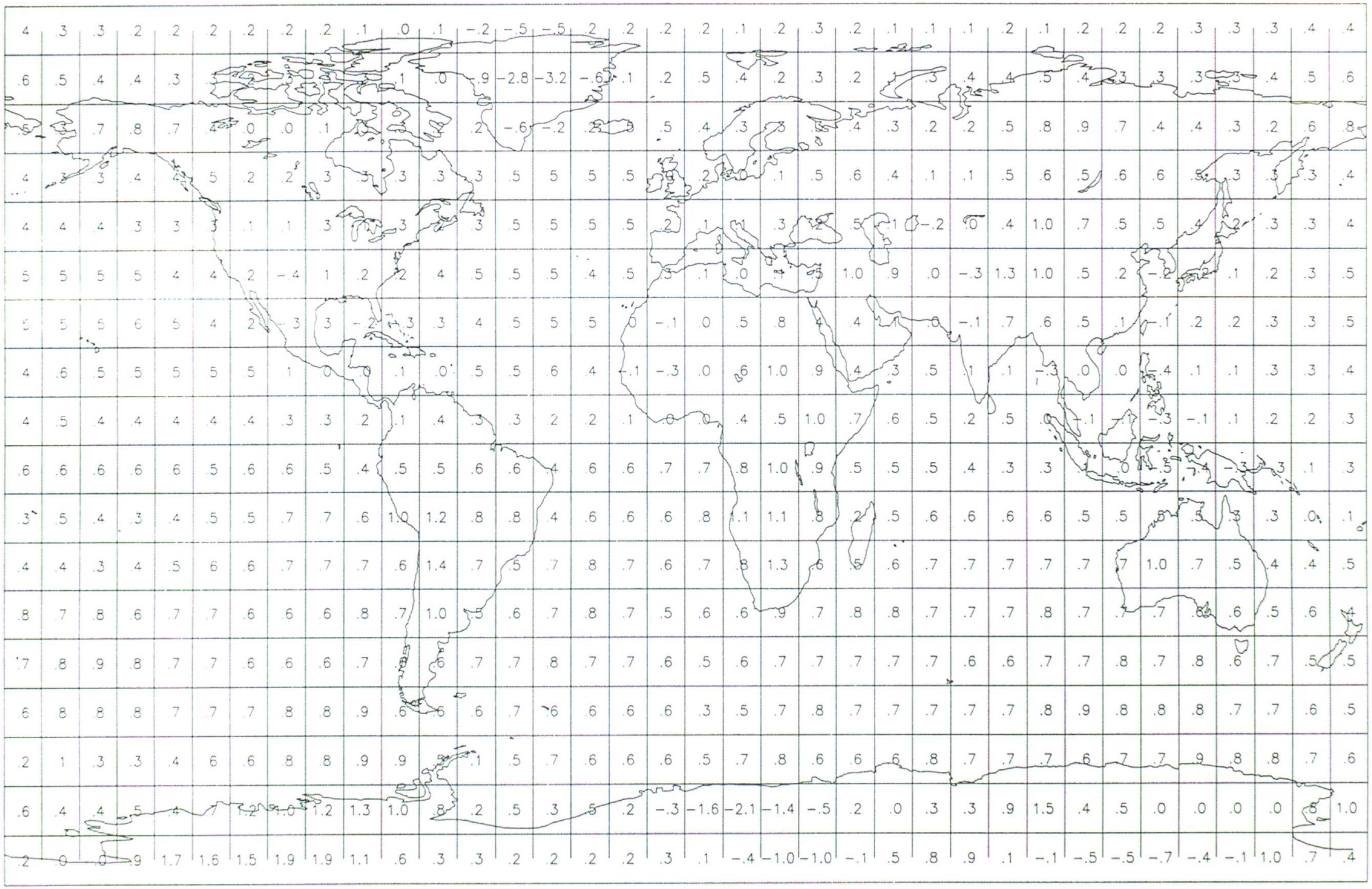

.5 .5 .5 .5 .5 .5 .5 .4 .4 .4 .4 .4 .3 .3 .4 .4 .4 .4 .4 .4 .5 .5 .5 .5 .5 .5 .5 .5 .6 .5 .7 .8 .7 .6 .5 .5
.4 .5 .5 .5 .5 .5 .5 .4 .4 .4 .4 .4 .5 .4 .6 .6 .5 .5 .6 .6 .6 .5 .6 .7 .6 .5 .5 .6 .6 .7 .7 .8 .7 .5 .4
.5 .7 .8 .8 .8 .8 .7 .9 .9 .7 .8 .8 .7 .9 .7 .7 .9 .6 .8 .9 1.2 1.2 .9 .8 1.0 .9 .7 .7 .9 .9 1.0 1.0 1.0 .7 .5 .5
.8 .7 .9 .8 1.0 1.0 1.1 1.2 1.5 1.1 1.2 1.3 1.2 1.0 1.0 1.0 .9 1.9 1.0 2.3 1.9 1.4 1.1 1.1 1.2 1.3 1.3 1.6 1.2 1.6 1.6 1.1 .7 .6 .6
1.9 1.8 1.6 1.1 1.1 1.0 1.4 2.5 2.6 2.3 1.9 1.6 1.5 1.2 .9 .7 1.1 1.5 1.6 2.2 1.4 1.4 .9 1.0 1.7 1.7 1.6 1.8 1.8 1.9 1.7 1.7 1.9 2.0 2.2
1.5 1.8 1.3 1.1 1.0 .7 1.2 3.4 3.2 3.0 2.7 1.9 2.0 1.3 1.0 .9 .7 1.4 1.9 1.5 .7 .6 .6 .5 .6 2.0 2.6 4.0 3.4 2.7 2.8 2.8 2.8 2.7 2.0
1.4 1.3 .7 .7 .5 .6 1.3 4.8 2.6 3.4 3.1 2.3 2.4 1.0 .6 1.0 .5 .8 .6 .6 .4 .8 .9 .9 1.8 4.8 6.5 4.7 5.2 4.7 3.7 3.1 2.7 2.2 1.9 1.1
2.1 1.3 1.0 1.8 2.2 2.4 3.1 5.2 5.5 4.9 4.3 3.2 2.6 1.5 1.2 1.5 3.5 3.8 4.7 3.1 2.8 3.6 2.6 1.5 2.8 4.4 6.2 5.1 5.2 6.0 6.1 5.0 3.8 3.2 2.2 2.3
3.7 3.4 3.0 3.1 3.0 2.7 3.2 3.9 4.4 4.5 5.3 5.1 4.4 3.0 3.3 4.1 4.8 5.9 5.6 5.7 6.2 3.3 1.9 2.8 3.3 3.8 3.6 4.5 4.8 4.6 4.6 5.2 4.6 4.1 3.5 3.3
3.0 1.6 1.1 .5 .5 .5 .5 .5 .5 .7 3.0 4.0 3.3 2.6 1.7 1.8 1.4 1.0 1.3 3.8 4.1 1.9 1.6 2.3 3.4 3.6 4.0 4.0 3.6 3.1 3.7 4.5 4.3 4.9 4.6 4.0
3.4 1.6 .9 1.0 .6 .3 .4 .5 .6 .7 1.3 2.1 1.6 1.1 .8 .7 .5 .4 .4 .3 .4 .5 .4 .4 .5 .6 1.0 1.3 1.1 .7 .8 .8 .9 2.0 3.1 3.8
1.8 2.1 2.5 2.6 2.4 2.1 1.3 .9 1.1 .9 1.0 1.4 2.2 2.0 1.6 1.1 1.0 .7 .6 .7 .5 .7 .8 .5 .5 .7 .4 .4 .5 .6 .7 .7 .8 .9 1.3 1.7
1.3 1.7 2.6 2.7 2.4 2.6 2.6 2.5 2.3 1.7 1.7 2.2 2.4 2.5 1.8 1.6 1.7 1.8 1.2 1.2 1.2 1.4 1.6 1.4 1.0 1.0 1.2 1.1 .9 1.2 1.3 1.3 1.4 1.8 1.4
1.4 1.4 1.5 1.4 1.4 1.7 2.5 2.3 1.9 1.9 2.1 1.8 1.9 1.7 1.3 1.7 1.6 1.6 2.0 2.0 1.8 1.6 1.6 1.4 1.4 1.7 1.6 1.5 1.7 1.6 1.5 1.4 1.5 1.6 1.7
.9 1.1 1.2 .9 1.1 1.4 1.5 1.3 1.4 1.5 1.7 1.7 1.3 1.3 1.4 1.1 .9 .8 1.0 1.5 1.8 1.9 1.8 1.6 1.3 1.3 1.3 1.6 1.5 1.4 1.6 1.7 1.6 1.5 1.2 1.2
1.1 1.3 1.6 1.2 1.2 1.3 1.4 1.4 1.3 1.3 1.3 1.8 1.9 2.0 1.6 1.4 .8 .6 .9 1.1 1.4 1.8 2.0 1.7 1.2 1.2 1.2 1.6 1.4 1.2 1.0 1.3 1.5 1.3 1.3 1.2
1.2 1.4 1.8 1.8 1.6 1.5 1.3 1.4 1.3 1.1 1.0 1.4 1.6 1.5 1.4 1.4 1.0 1.0 1.5 1.7 2.2 2.5 2.3 1.9 1.9 1.8 1.6 1.3 1.1 1.2 1.3 1.2 1.5 1.5 1.4 1.2
1.5 1.9 2.3 2.4 2.3 2.0 1.6 1.5 1.3 1.2 1.3 1.5 1.5 1.4 1.2 .9 .8 .7 .8 1.2 1.5 1.8 1.9 2.0 1.9 1.7 1.4 1.1 .8 .7 .7 .7 .9 1.1 1.1 1.2

ATOVS : MEAN O-B BRIGHTNESS TEMPERATURE DIFFERENCES (DEG C)

FIGURE 34

JUNE 1999 : AMSUA-5 Channel (700 hPa)

NOAA-15, USING ALL OBSERVATIONS

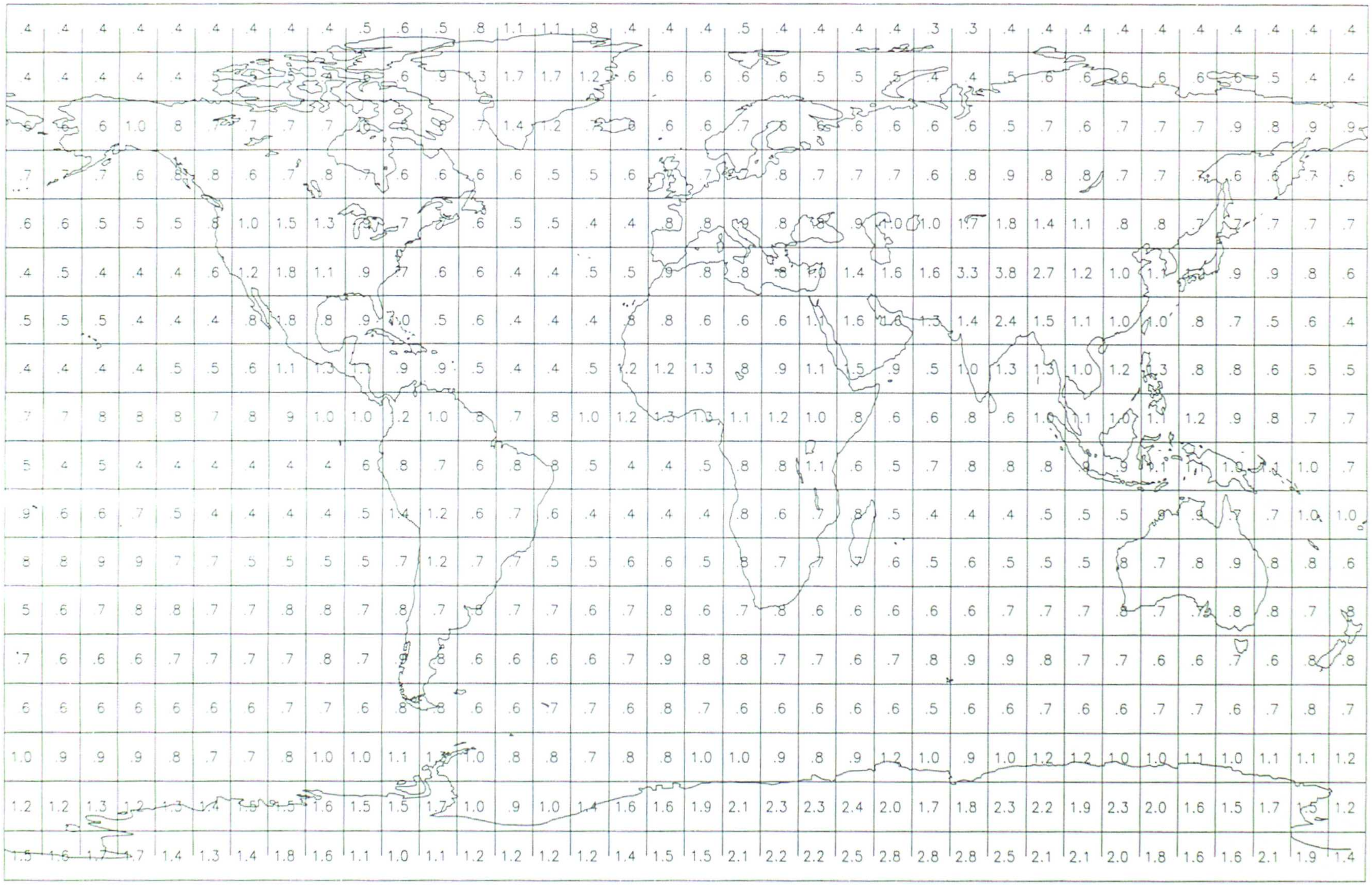


ATOVS : SD O-B BRIGHTNESS TEMPERATURE DIFFERENCES(DEG C)

FIGURE 35

JUNE 1999 : AMSUA-5 channel (700 hPa)

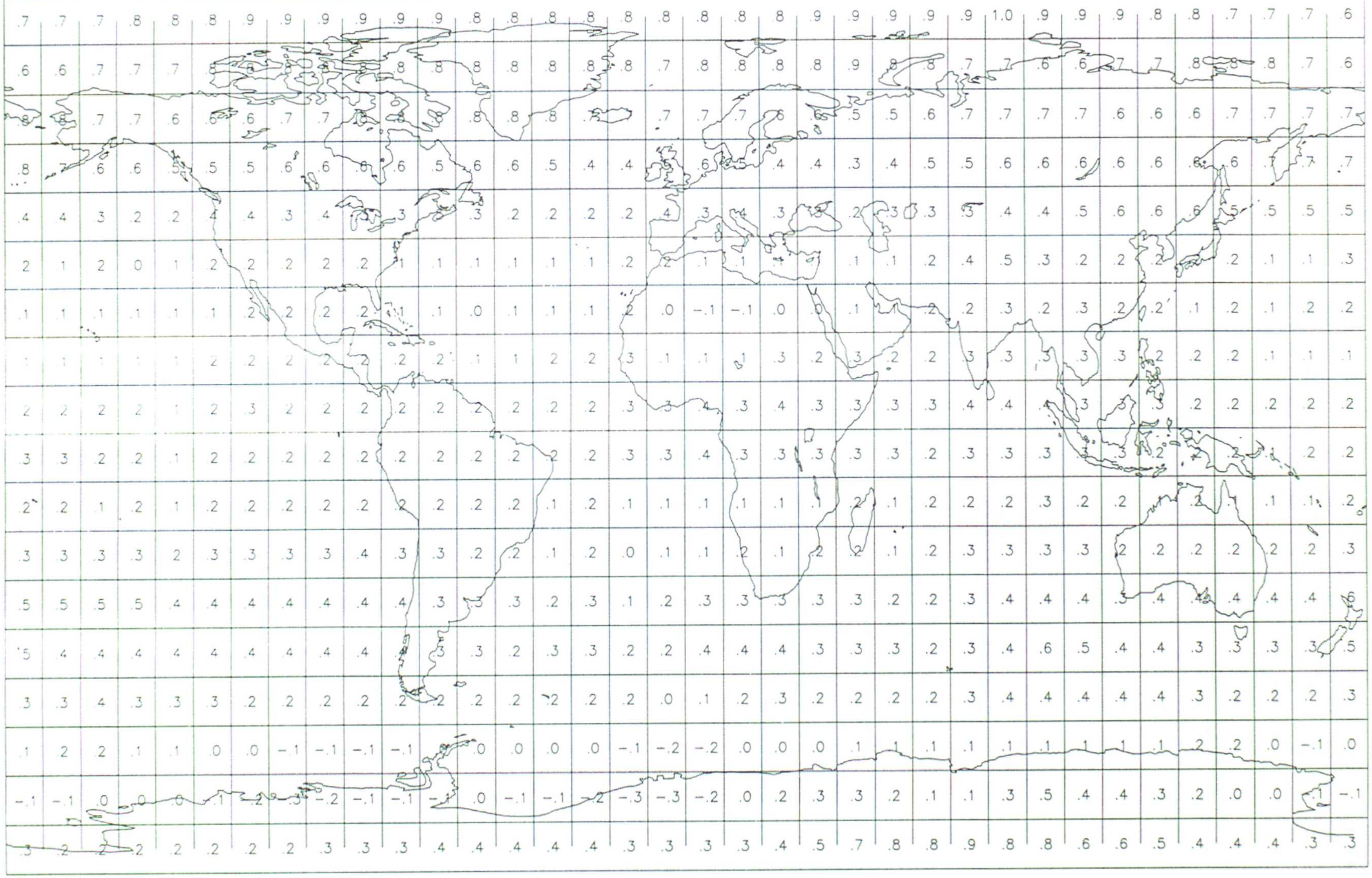
NOAA-15, USING ALL OBSERVATIONS



.4	.4	.4	.4	.4	.4	.4	.4	.4	.5	.6	.5	.8	1.1	1.1	.8	.4	.4	.4	.5	.4	.4	.4	.4	.3	.3	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4
.4	.4	.4	.4	.4	.5	.5	.5	.4	.5	.6	.9	1.3	1.7	1.7	1.2	.6	.6	.6	.6	.6	.5	.5	.5	.4	.4	.5	.6	.6	.6	.6	.6	.6	.5	.4	.4
.6	.6	.6	1.0	.8	.7	.7	.7	.7	.6	.8	.8	.7	1.4	1.2	.7	.8	.6	.6	.7	.6	.6	.6	.6	.6	.6	.5	.7	.6	.7	.7	.7	.9	.8	.9	.9
.7	.7	.7	.6	.8	.8	.6	.7	.8	.7	.6	.6	.6	.6	.5	.5	.6		.7		.8	.7	.7	.7	.6	.8	.9	.8	.8	.7	.7	.7	.6	.6	.7	.6
.6	.6	.5	.5	.5	.8	1.0	1.5	1.3	.9	.7		.6	.5	.5	.4	.4	.8	.8	.9	.8	.8	.9	1.0	1.0	1.7	1.8	1.4	1.1	.8	.8	.7	.7	.7	.7	.7
.4	.5	.4	.4	.4	.6	1.2	1.8	1.1	.9	.7	.6	.6	.4	.4	.5	.5	.9	.8	.8	.8	1.0	1.4	1.6	1.6	3.3	3.8	2.7	1.2	1.0	1.1		.9	.9	.8	.6
.5	.5	.5	.4	.4	.4	.8	1.8	.8	.9	1.0	.5	.6	.4	.4	.4	.8	.8	.6	.6	.6	1.1	1.6	1.6	1.3	1.4	2.4	1.5	1.1	1.0	1.0	.8	.7	.5	.6	.4
.4	.4	.4	.4	.5	.5	.6	1.1	1.3	1.1	.9	.9	.5	.4	.4	.5	1.2	1.2	1.3	.8	.9	1.1	1.5	.9	.5	1.0	1.3	1.3	1.0	1.2	1.3	.8	.8	.6	.5	.5
.7	.7	.8	.8	.8	.7	.8	.9	1.0	1.0	1.2	1.0	.8	.7	.8	1.0	1.2	1.3	1.3	1.1	1.2	1.0	.8	.6	.6	.8	.6	1.0	1.1	1.0	1.1	1.2	.9	.8	.7	.7
.5	.4	.5	.4	.4	.4	.4	.4	.4	.6	.8	.7	.6	.8	.8	.5	.4	.4	.5	.8	.8	1.1	.6	.5	.7	.8	.8	.8	.9	.9	1.1	1.1	1.0	1.1	1.0	.7
.9	.6	.6	.7	.5	.4	.4	.4	.4	.5	1.4	1.2	.6	.7	.6	.4	.4	.4	.4	.8	.6	.7	.8	.5	.4	.4	.4	.5	.5	.5	.9	.9	.7	.7	1.0	1.0
.8	.8	.9	.9	.7	.7	.5	.5	.5	.5	.7	1.2	.7	.7	.5	.5	.6	.6	.5	.8	.7	.7	.7	.6	.5	.6	.5	.5	.5	.8	.7	.8	.9	.8	.8	.6
.5	.6	.7	.8	.8	.7	.7	.8	.8	.7	.8	.7	.8	.7	.7	.6	.7	.8	.6	.7	.8	.6	.6	.6	.6	.6	.7	.7	.7	.8	.7	.7	.8	.8	.7	.8
.7	.6	.6	.6	.7	.7	.7	.7	.8	.7	.8	.8	.6	.6	.6	.6	.7	.9	.8	.8	.7	.7	.6	.7	.8	.9	.9	.8	.7	.7	.6	.6	.7	.6	.8	.8
.6	.6	.6	.6	.6	.6	.6	.7	.7	.6	.8	.8	.6	.6	.7	.7	.6	.8	.7	.6	.6	.6	.6	.6	.5	.6	.6	.7	.6	.6	.7	.7	.6	.7	.8	.7
1.0	.9	.9	.9	.8	.7	.7	.8	1.0	1.0	1.1	1.3	1.0	.8	.8	.7	.8	.8	1.0	1.0	.9	.8	.9	1.2	1.0	.9	1.0	1.2	1.2	1.0	1.0	1.1	1.0	1.1	1.1	1.2
1.2	1.2	1.3	1.2	1.3	1.4	1.5	1.5	1.6	1.5	1.5	1.7	1.0	.9	1.0	1.4	1.6	1.6	1.9	2.1	2.3	2.3	2.4	2.0	1.7	1.8	2.3	2.2	1.9	2.3	2.0	1.6	1.5	1.7	1.5	1.2
1.5	1.6	1.7	1.7	1.4	1.3	1.4	1.8	1.6	1.1	1.0	1.1	1.2	1.2	1.2	1.2	1.4	1.5	1.5	2.1	2.2	2.2	2.5	2.8	2.8	2.8	2.5	2.1	2.1	2.0	1.8	1.6	1.6	2.1	1.9	1.4

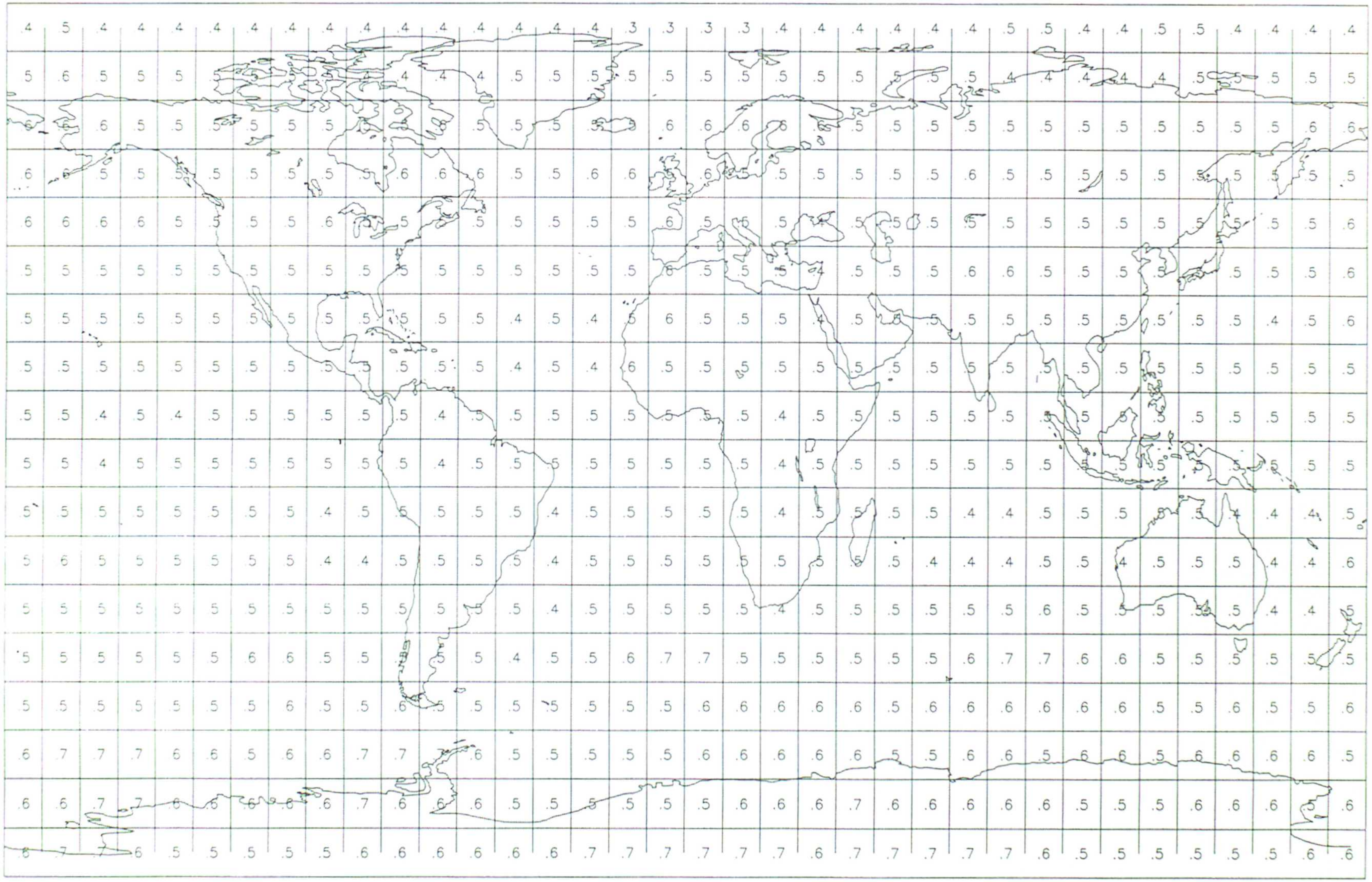
ATOVS : MEAN O-B BRIGHTNESS TEMPERATURE DIFFERENCES (DEG C)
JUNE 1999 : AMSUA-7 Channel (300 hPa)
NOAA-15, USING ALL OBSERVATIONS

FIGURE 36


.7 .7 .7 .8 .8 .8 .9 .9 .9 .9 .9 .9 .8 .8 .8 .8 .8 .8 .8 .8 .8 .9 .9 .9 .9 .9 1.0 .9 .9 .9 .8 .8 .7 .7 .7 .6
.6 .6 .7 .7 .7 .8 .8 .8 .8 .8 .8 .8 .8 .8 .8 .8 .8 .7 .8 .8 .8 .8 .9 .8 .8 .7 .7 .6 .6 .7 .7 .8 .8 .8 .7 .6
.8 .8 .7 .7 .6 .6 .6 .7 .7 .8 .8 .8 .8 .8 .8 .7 .7 .7 .7 .6 .6 .5 .5 .6 .7 .7 .7 .7 .6 .6 .6 .7 .7 .7 .7
.8 .7 .6 .6 .5 .5 .5 .6 .6 .6 .6 .5 .6 .6 .5 .4 .4 .5 .6 .5 .4 .4 .3 .4 .5 .5 .6 .6 .6 .6 .6 .6 .6 .7 .7 .7
.4 .4 .3 .2 .2 .4 .4 .3 .4 .3 .3 .3 .3 .2 .2 .2 .2 .4 .3 .4 .3 .3 .2 .3 .3 .3 .4 .4 .5 .6 .6 .6 .5 .5 .5 .5
.2 .1 .2 .0 .1 .2 .2 .2 .2 .2 .1 .1 .1 .1 .1 .1 .2 .2 .1 .1 .1 .1 .1 .1 .2 .4 .5 .3 .2 .2 .2 .2 .1 .1 .3
.1 .1 .1 .1 .1 .1 .2 .2 .2 .2 .1 .1 .0 .1 .1 .1 .2 .0 -.1 -.1 .0 .0 .1 .1 .2 .2 .3 .2 .3 .2 .2 .1 .2 .1 .2 .2
.1 .1 .1 .1 .1 .2 .2 .2 .2 .2 .2 .2 .1 .1 .2 .2 .3 .1 .1 .1 .3 .2 .3 .2 .2 .3 .3 .3 .3 .3 .2 .2 .2 .1 .1 .1
.2 .2 .2 .2 .1 .2 .3 .2 .2 .2 .2 .2 .2 .2 .2 .2 .3 .3 .4 .3 .4 .3 .3 .3 .3 .4 .4 .4 .3 .3 .3 .2 .2 .2 .2 .2
.3 .3 .2 .2 .1 .2 .2 .2 .2 .2 .2 .2 .2 .2 .2 .2 .3 .3 .4 .3 .3 .3 .3 .3 .2 .3 .3 .3 .3 .3 .2 .2 .2 .1 .2 .2
.2 .2 .1 .2 .1 .2 .2 .2 .2 .2 .2 .2 .2 .2 .1 .2 .1 .1 .1 .1 .1 .1 .2 .1 .2 .2 .2 .3 .2 .2 .1 .2 .1 .1 .1 .2
.3 .3 .3 .3 .2 .3 .3 .3 .3 .4 .3 .3 .2 .2 .1 .2 .0 .1 .1 .2 .1 .2 .2 .1 .2 .3 .3 .3 .3 .2 .2 .2 .2 .2 .2 .3
.5 .5 .5 .5 .4 .4 .4 .4 .4 .4 .4 .3 .3 .3 .2 .3 .1 .2 .3 .3 .3 .3 .3 .2 .2 .3 .4 .4 .4 .3 .4 .4 .4 .4 .4 .6
.5 .4 .4 .4 .4 .4 .4 .4 .4 .4 .4 .3 .3 .2 .3 .3 .2 .2 .4 .4 .4 .3 .3 .3 .2 .3 .4 .6 .5 .4 .4 .3 .3 .3 .3 .5
.3 .3 .4 .3 .3 .3 .2 .2 .2 .2 .2 .2 .2 .2 .2 .2 .2 .0 .1 .2 .3 .2 .2 .2 .2 .3 .4 .4 .4 .4 .4 .3 .2 .2 .2 .3
.1 .2 .2 .1 .1 .0 .0 -.1 -.1 -.1 -.1 .0 .0 .0 .0 .0 -.1 -.2 -.2 .0 .0 .0 .1 .1 .1 .1 .1 .1 .1 .1 .1 .2 .2 .0 -.1 .0
-.1 -.1 .0 .0 .0 .1 -.2 -.3 -.2 -.1 -.1 -.1 .0 -.1 -.1 -.2 -.3 -.3 -.2 .0 .2 .3 .3 .2 .1 .1 .3 .5 .4 .4 .3 .2 .0 .0 -.1 -.1
.3 .2 .2 .2 .2 .2 .2 .2 .3 .3 .3 .4 .4 .4 .4 .4 .3 .3 .3 .3 .4 .5 .7 .8 .8 .9 .8 .8 .6 .6 .5 .4 .4 .4 .3 .3

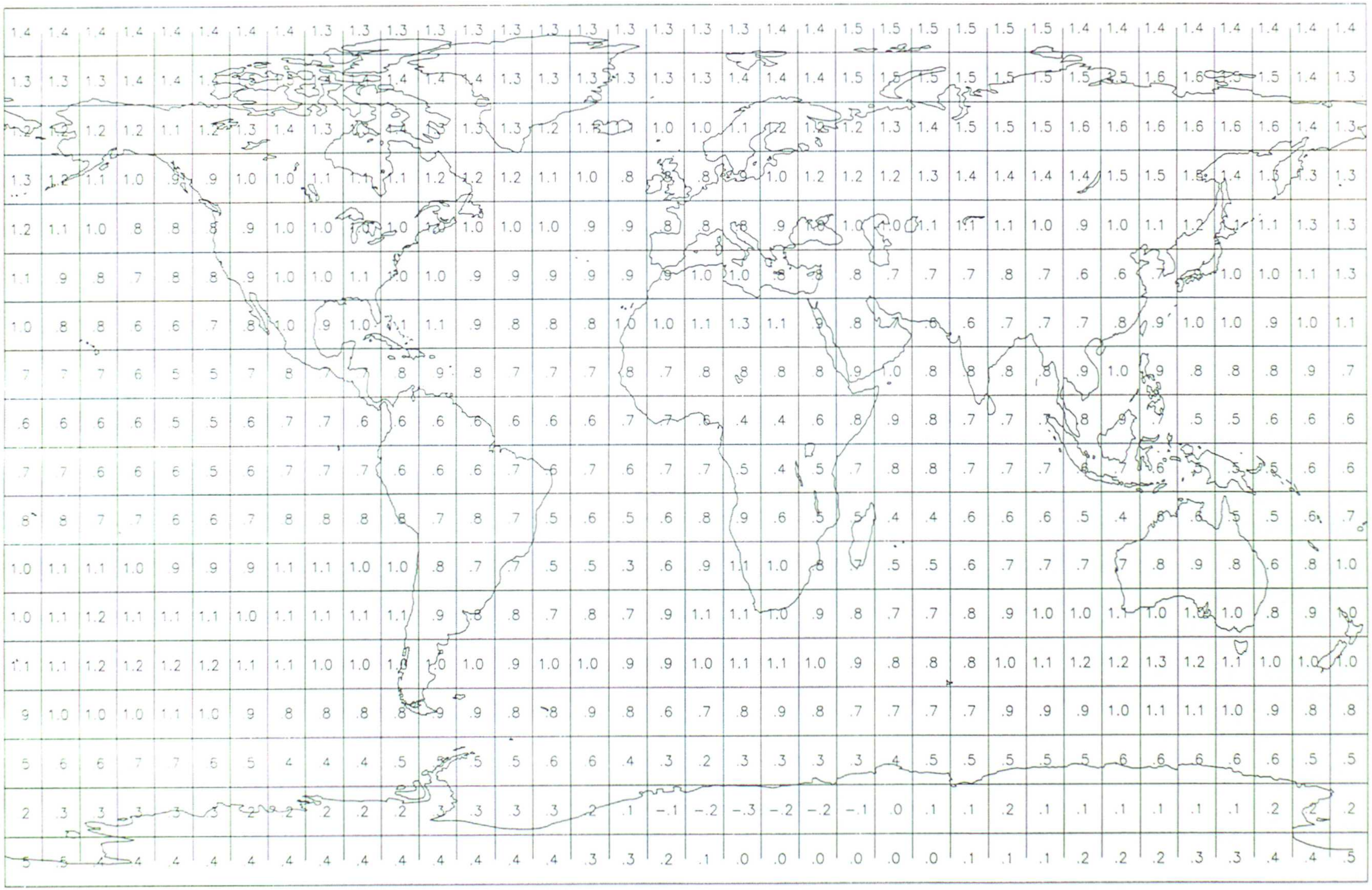
ATOVS : SD O-B BRIGHTNESS TEMPERATURE DIFFERENCES(DEG C)
JUNE 1999 : AMSUA-7 channel (300 hPa)
NOAA-15, USING ALL OBSERVATIONS

FIGURE 37


.4 .5 .4 .4 .4 .4 .4 .4 .4 .4 .4 .4 .4 .4 .4 .4 .3 .3 .3 .3 .4 .4 .4 .4 .4 .4 .5 .5 .4 .4 .5 .5 .4 .4 .4 .4
.5 .6 .5 .5 .5 .5 .5 .5 .5 .4 .4 .4 .4 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .4 .4 .4 .4 .4 .5 .5 .5 .5 .5
.6 .6 .6 .5 .5 .5 .5 .5 .5 .5 .5 .6 .5 .5 .5 .5 .5 .6 .6 .6 .6 .6 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .6 .6
.6 .6 .5 .5 .5 .5 .5 .5 .5 .5 .6 .6 .6 .5 .5 .6 .6 .5 .6 .5 .5 .5 .5 .5 .5 .6 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5
.6 6 .6 .6 .5 .5 .5 .5 .6 .5 .5 .5 .5 .5 .5 .5 .6 .5 .5 .5 .4 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .6
.5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .6 .5 .5 .5 .4 .5 .5 .5 .6 .6 .5 .5 .5 .5 .5 .5 .5 .6
.5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .4 .5 .4 .5 6 .5 .5 .5 .4 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .4 .5 .6
.5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .4 .5 .4 .6 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5
.5 .5 .4 .5 .4 .5 .5 .5 .5 .5 .5 .4 .5 .5 .5 .5 .5 .5 .5 .5 .4 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5
.5 .5 .4 .5 .5 .5 .5 .5 .5 .5 .5 .4 .5 .5 .5 .5 .5 .5 .5 .5 .4 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5
.5 .5 .5 .5 .5 .5 .5 .5 .4 .5 .5 .5 .5 .5 .4 .5 .5 .5 .5 .5 .4 .5 .5 .5 .5 .4 .4 .5 .5 .5 .5 .5 .4 .4 .4 .5
.5 .6 .5 .5 .5 .5 .5 .5 .4 .4 .5 .5 .5 .5 .4 .5 .5 .5 .5 .5 .5 .5 .5 .5 .4 .4 .4 .5 .5 .4 .5 .5 .5 .4 .4 .6
.5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .4 .5 .5 .5 .5 .5 .4 .5 .5 .5 .5 .5 .5 .6 .5 .5 .5 .5 .5 .4 .4 .5
.5 .5 .5 .5 .5 .5 .6 .6 .5 .5 .5 .5 .5 .4 .5 .5 .6 .7 .7 .5 .5 .5 .5 .5 .5 .6 .7 .7 .6 .6 .5 .5 .5 .5 .5 .5
.5 .5 .5 .5 .5 .5 .5 .6 .5 .5 .6 .5 .5 .5 .5 .5 .5 .5 .6 .6 .6 .6 .6 .5 .6 .6 .6 .6 .6 .6 .5 .5 .6 .5 .5 .6
.6 .7 .7 .7 .6 .6 .5 .6 .6 .7 .7 .7 .6 .5 .5 .5 .5 .5 .6 .6 .6 .6 .6 .5 .5 .6 .6 .5 .6 .6 .5 .6 .6 .6 .6 .5
.6 .6 .7 .7 .6 .5 .6 .6 .6 .7 .6 .6 .6 .5 .5 .5 .5 .5 .5 .6 .6 .6 .7 .6 .6 .6 .6 .6 .5 .5 .5 .6 .6 .6 .5 .6
.6 .7 .7 .6 .5 .5 .5 .5 .5 .6 .6 .6 .6 .6 .6 .7 .7 .7 .7 .7 .7 .6 .7 .7 .7 .7 .7 .6 .5 .5 .5 .5 .5 .5 .6 .6

ATOVS : MEAN O–B BRIGHTNESS TEMPERATURE DIFFERENCES (DEG C)
JUNE 1999 : AMSUA–9 Channel (100 hPa)
NOAA–15, USING ALL OBSERVATIONS

FIGURE 38


1.4 1.4 1.4 1.4 1.4 1.4 1.4 1.4 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.4 1.4 1.5 1.5 1.5 1.5 1.5 1.5 1.4 1.4 1.4 1.4 1.4 1.4 1.4 1.4
1.3 1.3 1.3 1.4 1.4 [illegible] 1.3 1.5 1.4 1.4 1.4 1.4 1.4 1.3 1.3 1.3 1.3 1.3 1.3 1.4 1.4 1.4 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.6 1.6 1.5 1.5 1.4 1.3
1.2 1.2 1.2 1.2 1.1 1.2 1.3 1.4 1.3 [illegible] [illegible] 1.3 1.3 1.3 1.2 [illegible] [illegible] 1.0 1.0 1.1 1.2 1.2 1.2 1.3 1.4 1.5 1.5 1.5 1.6 1.6 1.6 1.6 1.6 1.6 1.4 1.3
1.3 1.2 1.1 1.0 .9 .9 1.0 1.0 1.1 1.1 1.1 1.2 1.2 1.2 1.1 1.0 .8 .8 .8 .9 1.0 1.2 1.2 1.2 1.3 1.4 1.4 1.4 1.4 1.5 1.5 1.5 1.4 1.3 1.3 1.3
1.2 1.1 1.0 .8 .8 .8 .9 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 .9 .9 .8 .8 .8 .9 1.0 1.0 1.0 1.1 1.1 1.1 1.0 .9 1.0 1.1 1.2 1.1 1.1 1.3 1.3
1.1 .9 .8 .7 .8 .8 .9 1.0 1.0 1.1 1.0 1.0 .9 .9 .9 .9 .9 .9 1.0 1.0 .8 .8 .8 .7 .7 .7 .8 .7 .6 .6 .7 [illegible] 1.0 1.0 1.1 1.3
1.0 .8 .8 .6 .6 .7 .8 1.0 .9 1.0 1.1 1.1 .9 .8 .8 .8 1.0 1.0 1.1 1.3 1.1 .9 .8 .7 .6 .6 .7 .7 .7 .8 .9 1.0 1.0 .9 1.0 1.1
.7 .7 .7 .6 .5 .5 .7 .8 .7 .7 .8 .9 .8 .7 .7 .7 .8 .7 .8 .8 .8 .8 .9 1.0 .8 .8 .8 .8 .9 1.0 .9 .8 .8 .8 .9 .7
.6 .6 .6 .6 .5 .5 .6 .7 .7 .6 .6 .6 .6 .6 .6 .6 .7 .7 .6 .4 .4 .6 .8 .9 .8 .7 .7 .7 .8 .9 .7 .5 .5 .6 .6 .6
.7 .7 .6 .6 .6 .5 .6 .7 .7 .7 .6 .6 .6 .7 .6 .7 .6 .7 .7 .5 .4 .5 .7 .8 .8 .7 .7 .7 .6 .7 .6 .5 .5 .5 .6 .6
.8 .8 .7 .7 .6 .6 .7 .8 .8 .8 .8 .7 .8 .7 .5 .6 .5 .6 .8 .9 .6 .5 .5 .4 .4 .6 .6 .6 .5 .4 .6 .6 .5 .5 .6 .7
1.0 1.1 1.1 1.0 .9 .9 .9 1.1 1.1 1.0 1.0 .8 .7 .7 .5 .5 .3 .6 .9 1.1 1.0 .8 .7 .5 .5 .6 .7 .7 .7 .7 .8 .9 .8 .6 .8 1.0
1.0 1.1 1.2 1.1 1.1 1.1 1.0 1.1 1.1 1.1 1.1 .9 .8 .8 .7 .8 .7 .9 1.1 1.1 1.0 .9 .8 .7 .7 .8 .9 1.0 1.0 1.1 1.0 1.0 1.0 .8 .9 1.0
1.1 1.1 1.2 1.2 1.2 1.2 1.1 1.1 1.0 1.0 1.0 1.0 1.0 .9 1.0 1.0 .9 .9 1.0 1.1 1.1 1.0 .9 .8 .8 .8 1.0 1.1 1.2 1.2 1.3 1.2 1.1 1.0 1.0 1.0
.9 1.0 1.0 1.0 1.1 1.0 .9 .8 .8 .8 .8 .9 .9 .8 .8 .9 .8 .6 .7 .8 .9 .8 .7 .7 .7 .7 .9 .9 .9 1.0 1.1 1.1 1.0 .9 .8 .8
.5 .6 .6 .7 .7 .6 .5 .4 .4 .4 .5 [illegible] .5 .5 .6 .6 .4 .3 .2 .3 .3 .3 .3 .4 .5 .5 .5 .5 .5 .6 .6 .6 .6 .6 .5 .5
.2 .3 .3 .3 .3 .3 .2 .2 .2 .2 .2 .3 .3 .3 .3 .2 .1 -.1 -.2 -.3 -.2 -.2 -.1 .0 .1 .1 .2 .1 .1 .1 .1 .1 .1 .2 .2 .2
.5 .5 .4 .4 .4 .4 .4 .4 .4 .4 .4 .4 .4 .4 .4 .3 .3 .2 .1 .0 .0 .0 .0 .0 .0 .1 .1 .1 .2 .2 .2 .3 .3 .4 .4 .5

ATOVS : SD O-B BRIGHTNESS TEMPERATURE DIFFERENCES(DEG C)
JUNE 1999 : AMSUA-9 channel (100 hPa)
NOAA-15, USING ALL OBSERVATIONS

FIGURE 39

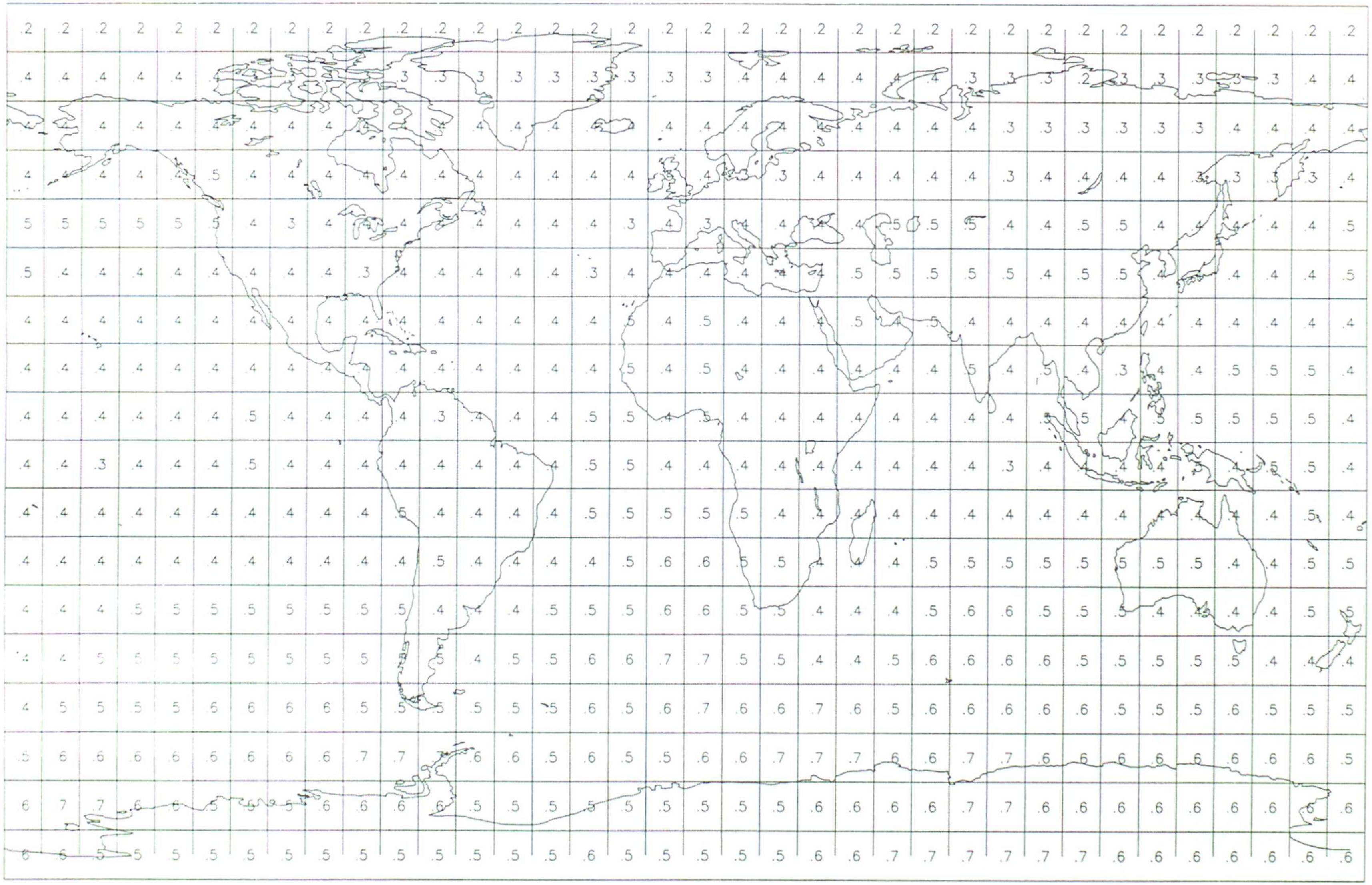


TABLE 8

MONTHLY MONITORING OF MARINE SURFACE OBSERVATIONS (COSNA)
DATA TYPE:- DRIFTER
MONITORING CENTRE: BRACKNELL
MONTH: June 1999

Monitoring procedures		
Period		:One calendar month.
Data monitored		:Reports from each unique identifier for drifting buoy.
Area monitored		:10°N - 80°N, 85°W - 0°W
Standard of comparison		:Background field from UKMO global model.
Position		:Average latitude and longitude for period.
Observation times		:All hours combined.
Elements monitored		:Mean sea-level pressure (hPa) :Wind speed (m s^{-1}) :Wind direction (degrees)
Parameters monitored		
	:NOBS	:Number of observations received excluding duplicates.
	:NGE	:Number of observations with gross errors.
	:PGE	:Percentage of observations with gross errors.
	:SD	:SD of difference of observations from background values excluding those with gross errors.
	:BIAS	:Mean difference of observations from background values excluding those with gross errors. **N.B. A positive bias indicates the observation is veered to the background**
	:RMS	:Root Mean Square difference of observations from background values excluding those with gross errors
GROSS ERROR LIMITS	:15 hPa (pressure) :25 m s^{-1} (Vector Wind)	

N.B. Observations of wind direction are only included in the wind direction statistics if the observed OR background wind speed > 5 m s^{-1}

IDENTIFIER	LAT.	LONG.	HOUR	ELEM	LEVEL	NOBS	NGE	PGE	SD	BIAS	RMS
MEAN SEA LEVEL PRESSURE											
39907	37.5	-25.2	ALL	P	SUR	1	0	0	0.0	0.1	0.1
41501	10.3	-48.0	ALL	P	SUR	356	0	0	1.0	-0.1	1.0
41502	25.3	-35.1	ALL	P	SUR	221	0	0	0.7	0.3	0.7
41504	25.5	-73.4	ALL	P	SUR	278	0	0	0.7	0.4	0.8
41505	29.4	-59.4	ALL	P	SUR	288	0	0	1.0	0.2	1.0
41521	28.6	-51.7	ALL	P	SUR	289	0	0	0.9	0.1	0.9
41522	23.0	-38.9	ALL	P	SUR	516	0	0	0.6	0.0	0.6
41528	28.1	-74.8	ALL	P	SUR	285	0	0	0.6	0.4	0.7
41598	26.1	-47.9	ALL	P	SUR	390	0	0	0.7	0.0	0.7
41599	27.9	-37.1	ALL	P	SUR	660	3	0	0.6	-0.5	0.8
41625	26.6	-75.7	ALL	P	SUR	274	0	0	0.6	0.4	0.7
41629	23.2	-65.6	ALL	P	SUR	19	0	0	0.5	0.2	0.5
41630	27.9	-79.1	ALL	P	SUR	11	0	0	0.6	-1.2	1.4
41636	23.9	-59.7	ALL	P	SUR	593	29	5	0.9	0.4	1.0
41637	25.3	-39.6	ALL	P	SUR	300	5	2	0.7	0.4	0.8
41638	25.1	-55.3	ALL	P	SUR	674	2	0	1.0	0.3	1.0
41640	27.9	-79.0	ALL	P	SUR	8	0	0	0.7	-1.0	1.2
41641	28.1	-79.5	ALL	P	SUR	8	0	0	0.8	-0.7	1.1
44513	36.9	-35.9	ALL	P	SUR	299	0	0	0.7	-1.1	1.4
44514	47.0	-28.3	ALL	P	SUR	319	0	0	0.8	-0.8	1.2
44515	40.8	-36.0	ALL	P	SUR	308	0	0	0.7	-0.6	0.9
44517	40.0	-34.4	ALL	P	SUR	302	0	0	0.7	-0.8	1.1
44546	45.2	-38.3	ALL	P	SUR	1795	0	0	1.0	-0.2	1.0
44607	52.6	-46.7	ALL	P	SUR	643	1	0	1.4	-0.4	1.5
44608	48.0	-32.4	ALL	P	SUR	1649	0	0	1.0	-0.3	1.0
44610	54.0	-38.3	ALL	P	SUR	1674	0	0	1.1	-0.5	1.2
44613	38.2	-18.2	ALL	P	SUR	1038	4	0	0.7	-0.3	0.7
44616	58.3	-20.4	ALL	P	SUR	1685	9	1	1.5	-0.3	1.5
44621	47.9	-37.7	ALL	P	SUR	686	9	1	1.0	-0.7	1.2
44624	56.0	-24.7	ALL	P	SUR	1568	6	0	1.3	-0.6	1.4
44728	52.3	-20.7	ALL	P	SUR	844	7	1	1.4	-0.6	1.5
44740	43.8	-51.5	ALL	P	SUR	1	0	0	0.0	1.0	1.0
44742	45.2	-5.1	ALL	P	SUR	1075	8	1	0.9	0.0	0.9
44760	53.4	-10.1	ALL	P	SUR	8	0	0	0.7	0.1	0.7
44764	49.5	-7.3	ALL	P	SUR	1184	7	1	1.2	-0.1	1.2
44765	36.5	-50.6	ALL	P	SUR	499	1	0	1.6	-0.2	1.6
44766	54.9	-44.5	ALL	P	SUR	932	15	2	1.5	-0.8	1.7
44773	56.9	-35.0	ALL	P	SUR	1519	9	1	1.1	-0.9	1.4
44777	63.7	-27.9	ALL	P	SUR	1810	14	1	1.2	-0.5	1.3
44778	48.2	-9.9	ALL	P	SUR	1273	8	1	1.0	0.0	1.0
49906	30.5	-47.8	ALL	P	SUR	6	0	0	0.8	0.0	0.8
62504	48.2	-8.1	ALL	P	SUR	413	0	0	1.3	-0.3	1.4
62505	47.2	-11.7	ALL	P	SUR	720	0	0	1.4	0.0	1.4
62506	45.4	-17.3	ALL	P	SUR	625	0	0	0.9	0.4	1.0
62520	38.1	-20.3	ALL	P	SUR	1016	5	0	0.8	-0.5	1.0
62554	39.5	-12.7	ALL	P	SUR	960	3	0	0.7	0.0	0.7
62675	40.0	-35.0	ALL	P	SUR	229	0	0	0.7	-0.6	0.9
62801	45.2	-5.0	ALL	P	SUR	1	0	0	0.0	0.1	0.1
62901	49.7	-9.8	ALL	P	SUR	100	0	0	0.7	0.4	0.8
64516	65.1	-31.3	ALL	P	SUR	2484	0	0	1.1	-0.5	1.2
64517	60.0	-42.9	ALL	P	SUR	1919	0	0	1.1	-0.5	1.2
64518	61.4	-38.8	ALL	P	SUR	2111	0	0	1.1	-0.8	1.4
64529	61.0	-9.3	ALL	P	SUR	1159	7	1	1.5	-0.5	1.6
64691	65.9	-27.8	ALL	P	SUR	472	70	15	3.9	8.7	9.5
64692	64.8	-24.8	ALL	P	SUR	482	0	0	1.4	-0.6	1.5
64693	65.8	-25.3	ALL	P	SUR	511	0	0	1.1	-0.5	1.2
64694	66.3	-24.5	ALL	P	SUR	566	0	0	1.2	-0.6	1.3
64695	65.7	-24.9	ALL	P	SUR	1090	0	0	1.1	-0.3	1.1
64696	65.3	-24.0	ALL	P	SUR	969	0	0	1.0	-0.8	1.3
64697	64.8	-23.8	ALL	P	SUR	878	0	0	1.3	-0.7	1.5

MEAN SEA LEVEL PRESSURE

64698	65.3	-25.8	ALL	P	SUR	901	0	0	1.1	-0.7	1.3
64699	65.7	-25.6	ALL	P	SUR	596	1	0	1.5	-0.3	1.5
64700	64.8	-25.5	ALL	P	SUR	558	3	1	1.8	0.0	1.9
65592	62.2	-16.6	ALL	P	SUR	99	17	17	5.7	-5.7	8.1
65593	59.8	-21.3	ALL	P	SUR	1077	15	1	1.5	-0.6	1.6
65594	60.3	-32.2	ALL	P	SUR	1158	13	1	1.4	-0.7	1.6
65595	57.4	-38.6	ALL	P	SUR	1340	25	2	1.1	-1.1	1.6
65599	61.3	-31.6	ALL	P	SUR	1930	19	1	1.3	-0.2	1.3

WIND SPEED

39907	37.5	-25.2	ALL	SPEED	SUR	1	0	0	0.0	-1.1	1.1
41504	25.5	-73.4	ALL	SPEED	SUR	154	0	0	2.4	-2.8	3.6
41521	28.6	-51.7	ALL	SPEED	SUR	256	0	0	1.5	-0.8	1.7
41625	26.6	-75.7	ALL	SPEED	SUR	264	0	0	1.3	-0.4	1.3
41629	23.2	-65.6	ALL	SPEED	SUR	49	0	0	1.9	-3.6	4.1
41636	23.9	-59.7	ALL	SPEED	SUR	328	0	0	1.8	-1.7	2.4
41637	25.3	-39.6	ALL	SPEED	SUR	170	0	0	1.0	-2.5	2.7
41638	25.1	-55.3	ALL	SPEED	SUR	398	0	0	1.3	-1.7	2.2
44607	52.6	-46.7	ALL	SPEED	SUR	633	0	0	2.1	1.3	2.5
44740	43.8	-51.5	ALL	SPEED	SUR	1	0	0	0.0	-2.6	2.6
44742	45.2	-5.1	ALL	SPEED	SUR	1	0	0	0.0	24.9	24.9
44773	56.9	-35.0	ALL	SPEED	SUR	1077	0	0	1.7	-0.4	1.7
44777	63.7	-27.9	ALL	SPEED	SUR	1295	0	0	2.3	-2.3	3.3
49906	30.5	-47.8	ALL	SPEED	SUR	6	0	0	2.3	0.8	2.4
62504	48.2	-8.1	ALL	SPEED	SUR	513	0	0	1.3	-0.8	1.5
62505	47.2	-11.7	ALL	SPEED	SUR	677	0	0	1.5	0.3	1.5
62506	45.4	-17.3	ALL	SPEED	SUR	623	0	0	1.6	0.7	1.7
62801	45.2	-5.0	ALL	SPEED	SUR	1	0	0	0.0	0.6	0.6
65599	61.3	-31.6	ALL	SPEED	SUR	1406	0	0	2.0	0.3	2.1

WIND DIRECTION

39907	37.5	-25.2	ALL	DIRN.	SUR	1	0	0	0.0	56.1	56.1
41504	25.5	-73.4	ALL	DIRN.	SUR	49	0	0	13.2	4.1	13.8
41521	28.6	-51.7	ALL	DIRN.	SUR	99	0	0	18.8	-12.9	22.7
41625	26.6	-75.7	ALL	DIRN.	SUR	159	0	0	15.9	10.0	18.8
41636	23.9	-59.7	ALL	DIRN.	SUR	29	0	0	24.8	3.6	25.1
41637	25.3	-39.6	ALL	DIRN.	SUR	19	0	0	32.9	-32.0	45.9
41638	25.1	-55.3	ALL	DIRN.	SUR	108	0	0	17.4	17.2	24.5
44607	52.6	-46.7	ALL	DIRN.	SUR	485	0	0	18.3	4.0	18.8
44742	45.2	-5.1	ALL	DIRN.	SUR	1	0	0	0.0	0.9	0.9
44773	56.9	-35.0	ALL	DIRN.	SUR	864	0	0	18.4	-2.6	18.6
44777	63.7	-27.9	ALL	DIRN.	SUR	638	0	0	16.7	2.1	16.8
49906	30.5	-47.8	ALL	DIRN.	SUR	6	0	0	44.4	4.5	44.7
62504	48.2	-8.1	ALL	DIRN.	SUR	224	0	0	11.8	-3.2	12.2
62505	47.2	-11.7	ALL	DIRN.	SUR	355	0	0	16.3	-13.3	21.0
62506	45.4	-17.3	ALL	DIRN.	SUR	259	0	0	17.2	-0.5	17.2
62801	45.2	-5.0	ALL	DIRN.	SUR	1	0	0	0.0	-8.5	8.5
65599	61.3	-31.6	ALL	DIRN.	SUR	971	0	0	14.9	1.3	14.9

TABLE 9

MONTHLY MONITORING OF AIRCRAFT OBSERVATIONS (COSNA)
MONITORING CENTRE: BRACKNELL
MONTH: June 1999

Monitoring procedures:

Period		:One calendar month.
Data monitored		:Statistics for each airline carrier.
Area monitored		:40°N - 70°N, 60°W - 0°W.
Standard of comparison		:Background field from UKMO global model.
Observation times		:All hours combined.
Level(s) monitored		:300.0 - 150.0 hPa
Elements monitored		:TEMP in °C ; WIND in m s^{-1}
Parameters monitored	:N REP.	:Number of observations received excluding duplicates.
	:PG	:Percentage of observations with gross errors.
	:PR	:Percentage of observations rejected by quality control including rejections from the duplicate check.
	:PC	:Percentage of observations with calm winds.
	:RMS	:Root Mean Square difference of observations from background values excluding those with gross errors in Temperature & vector wind.
	:BIAS	:Mean difference of observations from background values excluding those with gross errors in Temperature & vector wind.
GROSS ERROR LIMITS	:10.0 °C ; 60 m s^{-1} Vector Wind	
SELECTION CRITERIA	:N REP $\geq$ 20	

NB: US ACARs and ADS data are shown at the bottom of the table as US ACAR and ADS respectively.

		TEMPERATURE						WIND			
IDENT.	N.REP.	PG	PR	RMS	BIAS	N.REP.	PG	PR	PC	RMS	BIAS
AAL	3995	1	13	1.8	0.0	3989	0	14	0	9.1	0.9
ACA	2081	1	8	1.9	-0.1	2113	0	8	0	7.6	0.6
AEA	236	0	6	2.4	0.4	235	1	9	0	8.8	0.7
AEL	252	0	21	2.4	0.5	268	0	22	0	8.7	1.0
AFL	397	1	10	2.1	0.7	403	1	10	0	8.8	0.8
AFR	1305	0	12	1.7	0.1	1334	0	15	0	9.4	0.8
AIH	81	2	7	1.3	0.1	79	1	9	0	10.3	1.7
AMM	55	0	4	1.6	-0.1	55	0	5	0	7.5	-0.6
AMX	243	1	7	2.1	-0.2	243	0	7	0	9.0	1.5
ANZ	229	0	9	2.0	-1.0	228	0	11	0	6.8	0.3
AOM	336	1	5	1.6	0.7	338	0	5	0	7.6	0.9
AUA	22	0	18	2.4	0.6	23	0	17	0	6.7	0.7
AVA	158	0	6	2.0	-0.1	160	0	6	0	7.2	0.3
AVE	40	3	8	2.0	0.9	40	0	5	0	11.0	2.9
AZA	494	2	11	2.4	0.3	515	0	13	0	10.1	1.0
BAL	300	0	18	1.9	-0.5	317	0	21	0	8.3	0.7
BAW	1587	1	13	2.2	-0.1	1606	0	13	0	8.2	0.9
BLX	37	3	3	1.6	-0.6	38	0	5	0	10.4	0.8
BWA	97	0	6	1.7	1.1	103	0	8	0	8.8	-0.2
CDN	886	0	9	2.0	0.4	891	0	10	0	8.7	1.1
CFC	48	0	17	1.8	0.4	47	0	23	0	9.3	-0.5
CFG	552	0	7	2.2	-0.4	562	0	6	0	8.7	0.8
CKT	94	1	6	2.1	1.3	98	0	3	0	6.0	0.3
CLX	396	1	5	1.9	-0.3	396	0	7	0	8.7	-0.3
CMM	515	0	7	1.7	-0.1	512	0	7	0	6.8	0.8
COA	751	0	11	1.5	0.0	747	0	16	0	13.4	2.8
CRL	189	1	3	1.7	0.3	191	1	3	0	6.1	0.7
CTB	156	1	5	1.7	-0.3	162	0	6	0	6.2	0.8
CUB	200	1	14	1.8	0.7	200	1	14	0	8.3	1.1
DAL	2575	0	19	1.8	-0.4	2631	0	20	0	9.6	0.8
DBY	429	0	4	1.4	-0.4	447	0	6	0	7.7	1.1
DLH	2585	1	10	1.9	0.0	2570	0	10	0	7.7	0.9
EEZ	43	0	16	2.0	-0.8	45	0	18	0	9.4	-0.3
EIA	29	0	3	1.7	0.3	28	0	21	0	13.9	2.8
ELY	144	1	6	1.7	-0.1	146	0	6	0	7.5	0.4
ETH	30	0	30	1.1	0.0	30	7	33	0	5.7	0.3
EWW	97	1	13	1.5	0.3	97	0	14	0	10.5	2.1
FDX	386	0	15	1.6	0.3	397	0	16	0	10.2	1.4
FIN	572	1	13	2.1	0.6	563	0	13	0	8.6	0.5
GAF	126	4	13	1.8	-0.8	128	1	14	0	7.1	0.8
GRL	60	0	0	1.4	0.3	59	0	0	0	4.2	0.2
GTI	67	0	10	1.7	0.2	68	0	15	0	10.4	1.4
HLF	60	0	0	1.2	-0.6	59	0	2	0	6.8	1.6
IBE	1520	1	22	2.0	0.4	1534	0	24	0	8.8	0.9
ICE	1108	1	8	1.8	0.3	1097	0	9	0	8.5	1.1
IWD	123	0	3	1.4	-0.2	119	0	7	0	10.1	1.1
JKK	168	0	13	1.6	0.0	145	0	14	0	9.9	0.4
KLM	2053	0	10	1.9	0.1	2078	0	11	0	7.8	0.8
KSV	23	0	22	1.5	0.5	23	0	22	0	5.1	0.3
LDA	81	1	19	2.0	-0.3	83	0	18	0	8.7	0.3
LDI	201	2	16	2.1	0.0	204	0	17	0	8.7	0.1
LGL	20	0	0	2.2	-0.9	20	0	5	0	6.0	1.3
LIB	122	2	4	1.8	1.0	134	0	5	0	9.7	0.9
LOT	530	1	15	2.3	-1.0	532	0	16	0	9.4	0.9
LTU	485	0	12	1.6	-0.3	501	0	13	0	8.2	1.2
MAH	21	0	10	1.3	-0.6	24	0	8	0	6.4	0.2
MAS	59	3	15	2.7	0.8	61	0	11	0	9.1	1.8
MON	144	2	8	2.1	-0.3	148	0	6	0	7.1	1.2
MPD	105	1	9	2.0	1.0	105	0	10	0	8.3	1.1

		TEMPERATURE					WIND				
IDENT.	N.REP.	PG	PR	RMS	BIAS	N.REP.	PG	PR	PC	RMS	BIAS
MPH	616	1	6	1.9	-0.5	624	0	6	0	8.0	0.9
NCA	30	0	3	1.6	-0.2	30	0	7	0	7.0	0.2
NWA	3766	1	6	2.0	0.7	3568	0	4	0	8.2	0.9
OAL	24	0	21	3.1	2.0	24	0	21	0	11.6	2.5
PAC	95	1	11	1.8	0.5	95	0	13	0	9.4	0.2
RAM	70	0	3	1.5	0.0	70	0	6	0	9.1	0.6
RCH	121	1	12	1.9	0.9	125	0	58	0	13.7	2.1
RJA	37	5	22	2.5	0.2	39	0	18	0	9.6	3.0
ROY	256	1	13	1.9	-0.3	261	0	15	0	10.1	0.7
RRR	60	2	18	2.3	-0.8	59	0	17	0	11.7	0.2
SAS	1605	0	2	1.8	-0.3	1596	0	3	0	8.0	0.5
SIA	131	1	7	2.0	-1.2	144	0	7	0	7.9	0.4
SLR	86	1	43	4.8	2.4	90	0	17	0	6.7	0.1
SSV	30	0	10	2.2	0.2	29	0	3	0	4.0	0.7
SVA	166	1	7	1.9	-0.6	174	0	6	0	7.3	0.9
SWR	72	0	10	2.3	1.0	76	0	13	0	8.2	0.6
TAP	444	1	9	1.5	-0.2	448	0	11	0	8.4	1.2
TOW	129	1	18	2.1	0.8	128	0	17	0	8.8	1.1
TSC	181	2	17	2.2	0.7	183	0	15	0	10.1	1.0
TWA	1157	1	11	1.7	0.1	1093	0	13	0	9.1	1.0
UAL	2406	0	9	1.9	0.1	2433	0	11	0	7.7	0.7
UPS	746	0	27	1.8	0.2	748	0	27	0	9.4	1.0
USA	259	1	5	1.7	-0.2	233	0	5	0	8.8	1.9
VIR	448	1	7	1.8	-0.1	450	0	8	0	8.2	1.0
VKG	45	2	16	2.0	0.2	46	0	15	0	8.2	2.5
VPB	26	4	15	3.2	0.3	25	0	12	0	9.7	0.3
WOA	29	0	17	3.6	2.4	29	0	3	0	6.7	1.6
BA	8007	0	1	1.4	0.2	8002	0	1	0	5.9	0.9
KL	3294	0	5	1.7	0.9	3285	0	5	0	6.4	0.9
LH	45	0	2	2.4	1.8	45	0	2	0	4.2	-0.3
N	512	1	5	2.6	0.8	529	0	4	0	7.9	0.5
US ACARS	15388	0	2	1.5	0.5	15379	0	2	0	6.6	0.7

TABLE 10

MONTHLY MONITORING OF RADIOSONDE OBSERVATIONS (COSNA)
MONITORING CENTRE: BRACKNELL
MONTH: June 1999

Monitoring procedures

Period		:One calendar month.
Data monitored		:Reports from selected radiosonde TEMPs.
Area monitored		:0°N - 90°N, 100°W - 40°E
Standard of comparison		:Background field from UKMO global model.
Position		:Average latitude and longitude for period.
Observation times		:00, 12 UTC.
Level monitored		:100 hPa.
Element monitored		:GEOPOTENTIAL HEIGHT in metres
Parameters monitored	:NUM OBS	:Number of observations available at level shown during period.
	:NUM GROSS	:Number of gross errors at level shown during period.
	:SD	:SD of difference of observations from background values at level shown excluding those with gross errors.
	:BIAS	:Mean difference of observations from background values at level shown excluding those with gross errors.

GROSS ERROR LIMITS :Defined in Appendix I.1

WMO IDENT	OBS TIME	ELM	LEV	NUM OBS	NUM GROSS	SD	RMS	BIAS
DBBH	00	Z	100	1	0	0.0	17.0	17.0
DBBH	12	Z	100	18	0	19.6	19.7	-1.9
DBLK	12	Z	100	1	0	0.0	11.0	11.0
ELML7	00	Z	100	11	0	12.1	23.9	20.5
ELML7	12	Z	100	12	0	20.5	37.7	31.7
FNOR	00	Z	100	10	0	9.0	28.7	27.2
FNOR	12	Z	100	11	0	18.0	22.9	14.3
FNOU	00	Z	100	12	0	9.5	21.2	18.9
FNOU	12	Z	100	11	0	10.6	17.7	14.2
FNPH	00	Z	100	8	0	7.2	7.5	-1.9
FNPH	12	Z	100	11	0	16.6	16.6	-1.3
FNRS	00	Z	100	9	0	13.5	19.7	14.3
FNRS	12	Z	100	13	0	13.1	15.1	7.5
JBOA	00	Z	100	1	0	0.0	23.0	23.0
JCCX	00	Z	100	1	0	0.0	11.0	11.0
JGQH	00	Z	100	1	0	0.0	19.0	19.0
LDWR	00	Z	100	19	0	10.2	18.1	14.9
LDWR	12	Z	100	26	0	20.7	20.7	1.0
OVYA2	00	Z	100	5	0	8.0	13.8	11.2
OVYA2	12	Z	100	4	0	15.7	16.4	-5.0
OXYH2	00	Z	100	6	0	8.2	23.2	21.7
OXYH2	12	Z	100	6	0	8.1	17.9	16.0
SHIPDH	00	Z	100	1	0	0.0	10.0	10.0
SHIPDH	12	Z	100	2	0	13.5	64.9	63.5
UCKZ	00	Z	100	1	0	0.0	44.0	44.0
XXBA	12	Z	100	6	0	10.0	47.9	46.8
03953	00	Z	100	22	0	6.5	32.9	32.2
03953	12	Z	100	28	0	11.8	22.7	19.4
04018	00	Z	100	26	0	10.5	19.0	15.9
04018	12	Z	100	30	0	10.1	17.0	13.7
04220	00	Z	100	7	0	13.4	22.8	18.4
04220	12	Z	100	6	0	12.8	24.2	20.5
04270	00	Z	100	24	0	13.8	25.5	21.4
04270	12	Z	100	27	0	10.6	18.9	15.7
04339	00	Z	100	19	0	10.6	20.6	17.6
04339	12	Z	100	21	0	10.9	16.7	12.7
04360	00	Z	100	25	0	9.1	21.9	19.9
04360	12	Z	100	28	0	14.1	23.3	18.5
08001	00	Z	100	12	0	10.0	25.0	22.9
08001	12	Z	100	17	0	70.0	70.4	-7.7
08508	00	Z	100	1	0	0.0	7.0	-7.0
08508	12	Z	100	11	0	11.6	13.4	-6.8
08522	00	Z	100	1	0	0.0	8.0	-8.0
08522	12	Z	100	28	0	10.4	10.4	1.1
08594	00	Z	100	1	0	0.0	9.0	9.0
08594	12	Z	100	19	0	20.9	23.5	10.8
60020	00	Z	100	2	0	5.5	16.4	15.5
60020	12	Z	100	3	0	18.7	18.7	-0.3
71600	00	Z	100	25	0	9.3	13.6	-9.9
71600	12	Z	100	30	0	11.5	21.6	-18.3
72201	00	Z	100	23	0	13.2	32.9	30.2
72201	12	Z	100	27	0	16.5	38.7	35.1
72402	00	Z	100	21	0	12.9	42.5	40.5
72402	12	Z	100	29	0	11.3	46.5	45.1
74494	00	Z	100	22	0	8.9	11.1	6.7
74494	12	Z	100	26	0	12.8	15.0	-7.8
78016	00	Z	100	22	0	17.9	19.5	7.6
78016	12	Z	100	27	0	17.1	17.6	4.3

TABLE 11

MONTHLY MONITORING OF RADIOSONDE OBSERVATIONS (COSNA)
MONITORING CENTRE: BRACKNELL
MONTH: June 1999

Monitoring procedures:

Period		:One calendar month.
Data monitored		:Reports from selected radiosonde TEMPs.
Area monitored		:0°N - 90°N, 100°W - 40°E
Standard of comparison		:Background field from UKMO global model.
Position		:Average latitude and longitude for period.
Observation times		:00, 12 UTC.
Level monitored		:500 hPa.
Element monitored		:GEOPOTENTIAL HEIGHT in metres
Parameters monitored	:NUM OBS	:Number of observations available at level shown during period.
	:NUM GROSS	:Number of gross errors at level shown during period.
	:SD	:SD of difference of observations from background values at level shown excluding those with gross errors.
	:BIAS	:Mean difference of observations from background values at level shown excluding those with gross errors.

GROSS ERROR LIMITS :Defined in Appendix 1.1

WMO IDENT	OBS TIME	ELM	LEV	NUM OBS	NUM GROSS	SD	RMS	BIAS
DBBH	00	Z	500	1	0	0.0	13.0	13.0
DBBH	12	Z	500	22	0	10.6	10.6	0.9
DBLK	00	Z	500	1	0	0.0	7.0	7.0
DBLK	12	Z	500	1	0	0.0	6.0	6.0
ELML7	00	Z	500	16	0	7.8	13.4	10.9
ELML7	12	Z	500	16	1	8.3	14.5	11.8
FNOR	00	Z	500	10	0	4.4	12.1	11.3
FNOR	12	Z	500	11	0	6.3	8.5	5.7
FNOU	00	Z	500	13	0	7.7	9.2	5.0
FNOU	12	Z	500	12	0	9.9	14.4	10.4
FNPH	00	Z	500	9	0	7.5	7.5	-0.9
FNPH	12	Z	500	12	0	7.5	7.5	0.1
FNRS	00	Z	500	11	0	10.8	11.0	1.8
FNRS	12	Z	500	13	0	8.7	9.0	2.4
JBOA	00	Z	500	1	0	0.0	6.0	6.0
JCCX	00	Z	500	1	0	0.0	8.0	8.0
JGQH	00	Z	500	1	0	0.0	13.0	13.0
LDWR	00	Z	500	20	0	7.9	9.6	5.4
LDWR	12	Z	500	27	0	17.8	18.9	-6.6
OVYA2	00	Z	500	5	0	7.7	7.7	-0.2
OVYA2	12	Z	500	5	0	8.2	16.4	-14.2
OXYH2	00	Z	500	6	0	6.6	9.2	6.5
OXYH2	12	Z	500	9	0	8.5	12.4	9.1
SHIPDH	00	Z	500	1	0	0.0	3.0	3.0
SHIPDH	12	Z	500	2	0	11.0	12.5	-6.0
UCKZ	00	Z	500	1	0	0.0	6.0	-6.0
XXBA	12	Z	500	11	0	14.3	14.9	4.0
03953	00	Z	500	26	0	8.9	13.1	9.6
03953	12	Z	500	30	0	6.5	9.9	7.4
04018	00	Z	500	26	0	10.8	13.1	7.5
04018	12	Z	500	30	0	14.1	14.2	1.6
04220	00	Z	500	25	0	14.2	15.6	6.4
04220	12	Z	500	30	0	8.6	9.5	3.9
04270	00	Z	500	24	0	14.5	15.5	5.5
04270	12	Z	500	29	0	12.0	12.1	-0.7
04339	00	Z	500	26	0	8.3	12.8	9.7
04339	12	Z	500	30	0	12.0	12.5	3.4
04360	00	Z	500	25	0	9.4	10.6	4.9
04360	12	Z	500	28	0	9.3	9.3	-0.8
08001	00	Z	500	25	1	7.7	9.6	5.7
08001	12	Z	500	30	0	21.4	21.5	-2.2
08508	00	Z	500	1	0	0.0	9.0	-9.0
08508	12	Z	500	27	0	9.3	9.8	2.9
08522	00	Z	500	1	0	0.0	6.0	-6.0
08522	12	Z	500	28	0	5.9	7.6	4.9
08594	00	Z	500	1	0	0.0	1.0	1.0
08594	12	Z	500	24	0	5.6	7.2	-4.5
60020	00	Z	500	25	0	7.8	7.8	-0.2
60020	12	Z	500	30	0	7.4	8.9	-4.9
71600	00	Z	500	25	0	6.9	7.9	-3.7
71600	12	Z	500	30	0	7.9	7.9	0.2
72201	00	Z	500	23	0	5.9	11.1	9.3
72201	12	Z	500	27	0	6.8	10.6	8.2
72402	00	Z	500	23	0	12.6	13.1	3.7
72402	12	Z	500	29	0	13.6	14.7	5.7
74494	00	Z	500	24	0	5.7	6.0	1.8
74494	12	Z	500	26	0	9.8	9.9	-1.3
78016	00	Z	500	22	0	18.5	22.5	12.9
78016	12	Z	500	27	0	20.1	21.7	8.1

TABLE 12

MONTHLY MONITORING OF RADIOSONDE OBSERVATIONS (COSNA)
MONITORING CENTRE: BRACKNELL
MONTH: June 1999

Monitoring procedures

Period		:One calendar month.
Data monitored		:Reports from selected radiosonde TEMPs.
Area monitored		:0°N - 90°N, 100°W - 40°E
Standard of comparison		:Background field from UKMO global model.
Position		:Average latitude and longitude for period.
Observation times		:00, 12 UTC.
Level monitored		:100 hPa.
Element monitored		:VECTOR WIND in m s^{-1}
Parameters monitored	:NUM OBS	:Number of observations available at level shown during period.
	:NUM GROSS	:Number of gross errors at level shown during period.
	:UBIAS,VBIAS	:Mean difference of observations of U and V components from background values at level shown excluding those with gross errors.
	:RMS	:Root Mean Square difference of observations from background values at level shown excluding those with gross errors.

GROSS ERROR LIMITS :Defined in Appendix I.2

WMO IDENT	OBS TIME	ELM	LEV	NUM OBS	NUM GROSS	% REJ	RMS	UBIAS	VBIAS
DBBH	00	V	100	1	0	0	0.0	-0.2	1.6
DBBH	12	V	100	11	0	0	0.0	0.5	0.4
DBLK	12	V	100	3	0	0	2.5	-0.9	-0.1
ELML7	00	V	100	3	0	0	2.5	1.3	0.4
ELML7	12	V	100	6	0	0	2.5	-2.1	-3.2
FNOR	00	V	100	7	0	14	2.5	2.5	-3.0
FNOR	12	V	100	11	0	0	2.5	-0.7	-1.5
FNOU	00	V	100	12	0	0	2.9	0.5	0.4
FNOU	12	V	100	12	0	0	2.8	1.5	0.9
FNPH	00	V	100	8	0	0	2.6	0.7	2.2
FNPH	12	V	100	11	0	0	2.6	-1.5	-0.3
FNRS	00	V	100	10	0	0	2.2	1.6	0.5
FNRS	12	V	100	11	0	0	3.8	0.6	-0.8
JBOA	00	V	100	1	0	0	3.2	1.3	1.7
JGQH	00	V	100	1	0	0	2.9	5.4	-1.1
LDWR	00	V	100	21	0	0	3.7	-0.7	0.3
LDWR	12	V	100	26	0	0	1.7	-0.6	0.0
OVYA2	00	V	100	5	0	0	1.3	0.7	0.7
OVYA2	12	V	100	4	0	0	1.3	1.2	0.1
OXYH2	00	V	100	5	0	20	1.3	-3.2	-3.1
OXYH2	12	V	100	6	0	16	1.3	-2.8	1.8
SHIPDH	00	V	100	1	0	0	1.3	-2.5	-0.5
SHIPDH	12	V	100	2	0	0	1.3	-5.4	-1.5
03953	00	V	100	22	0	0	2.2	0.4	0.5
03953	12	V	100	27	0	0	2.0	-0.1	0.5
04018	00	V	100	25	0	0	1.4	-0.2	0.4
04018	12	V	100	29	0	0	2.0	0.0	0.4
04220	00	V	100	4	0	0	1.7	1.3	-0.3
04220	12	V	100	6	0	0	1.7	0.5	0.7
04270	00	V	100	20	0	0	1.7	-0.2	-0.9
04270	12	V	100	26	0	0	2.9	1.4	-0.3
04339	00	V	100	17	0	0	2.3	-3.0	0.9
04339	12	V	100	20	0	5	3.6	0.2	-0.4
04360	00	V	100	25	0	0	2.6	-0.9	1.0
04360	12	V	100	28	0	0	2.2	0.3	-1.0
08001	00	V	100	12	0	0	6.1	1.3	0.4
08001	12	V	100	17	0	0	5.3	-0.9	-1.4
08508	12	V	100	8	0	0	3.3	1.3	-0.1
08594	00	V	100	1	0	0	3.0	-0.2	0.8
08594	12	V	100	22	0	0	3.0	-0.2	-1.0
71600	00	V	100	25	0	0	2.9	-0.3	0.0
71600	12	V	100	30	0	0	2.5	-0.7	0.0
72201	00	V	100	23	0	0	1.9	0.6	-1.8
72201	12	V	100	27	0	0	3.1	0.0	-1.0
72402	00	V	100	20	1	4	1.8	-0.5	8.4
72402	12	V	100	28	0	0	2.5	-0.9	-0.3
74494	00	V	100	22	0	0	3.0	0.0	-0.4
74494	12	V	100	26	0	0	2.7	-0.3	0.3
78016	00	V	100	22	0	0	3.7	-1.9	0.9
78016	12	V	100	27	0	0	2.5	-0.1	-0.6

TABLE 13

MONTHLY MONITORING OF RADIOSONDE OBSERVATIONS (COSNA)
MONITORING CENTRE: BRACKNELL
MONTH: June 1999

Monitoring procedures

Period		:One calendar month.
Data monitored		:Reports from selected radiosonde TEMPs.
Area monitored		:0°N - 90°N, 100°W - 40°E
Standard of comparison		:Background field from UKMO global model.
Position		:Average latitude and longitude for period.
Observation times		:00, 12 UTC.
Level monitored		:500 hPa.
Element monitored		:VECTOR WIND in m s^{-1}
Parameters monitored	:NUM OBS	:Number of observations available at level shown during period.
	:NUM GROSS	:Number of gross errors at level shown during period.
	:UBIAS,VBIAS:	Mean difference of observations of U and V components from background values at level shown excluding those with gross errors.
	:RMS	:Root Mean Square difference of observations from background values at level shown excluding those with gross errors.

GROSS ERROR LIMITS :Defined in Appendix I.2

WMO IDENT	OBS TIME	ELM	LEV	NUM OBS	NUM GROSS	% REJ	RMS	UBIAS	VBIAS
DBBH	00	V	500	1	0	0	0.0	5.6	0.2
DBBH	12	V	500	15	0	0	0.0	-0.8	0.7
DBLK	12	V	500	1	0	0	2.6	3.9	-0.3
ELML7	00	V	500	12	0	0	2.6	1.2	0.2
ELML7	12	V	500	12	0	0	3.3	0.1	0.1
FNOR	00	V	500	7	0	0	2.4	-0.8	-0.3
FNOR	12	V	500	11	0	0	2.4	-1.4	-0.2
FNOU	00	V	500	12	0	0	2.6	0.8	0.2
FNOU	12	V	500	11	0	0	2.3	-0.1	0.1
FNPH	00	V	500	9	0	0	2.6	-1.0	0.1
FNPH	12	V	500	9	0	0	2.6	1.0	-0.8
FNRS	00	V	500	10	0	0	2.6	-0.3	1.0
FNRS	12	V	500	10	0	0	2.3	-1.4	0.3
JBOA	00	V	500	1	0	0	3.5	-1.3	-0.9
JGQH	00	V	500	1	0	0	3.6	-0.8	-0.1
LDWR	00	V	500	21	0	0	3.6	-1.3	-0.1
LDWR	12	V	500	27	0	0	2.9	0.1	-1.0
OVYA2	00	V	500	4	0	0	3.3	3.7	-0.9
OVYA2	12	V	500	4	0	0	3.3	-0.4	-0.1
OXYH2	00	V	500	6	0	16	3.3	-4.3	0.6
OXYH2	12	V	500	9	0	11	3.3	-0.3	0.7
SHIPDH	00	V	500	1	0	0	3.3	1.7	3.1
SHIPDH	12	V	500	2	0	50	3.3	-17.0	-2.1
03953	00	V	500	26	0	0	3.4	0.3	0.7
03953	12	V	500	29	0	0	2.7	0.2	-0.4
04018	00	V	500	25	0	0	2.7	1.0	0.2
04018	12	V	500	30	0	0	3.9	0.1	0.1
04220	00	V	500	23	0	0	1.7	-0.4	-0.7
04220	12	V	500	29	0	0	4.5	-0.7	-0.1
04270	00	V	500	20	0	0	3.9	0.0	-0.2
04270	12	V	500	26	0	0	3.8	-0.6	-0.4
04339	00	V	500	26	0	0	3.0	0.7	-0.6
04339	12	V	500	30	0	3	2.6	-0.7	0.5
04360	00	V	500	25	0	0	4.6	-0.1	-0.3
04360	12	V	500	27	0	0	2.5	-0.4	-0.1
08001	00	V	500	25	0	0	4.8	0.4	1.5
08001	12	V	500	29	0	0	2.4	0.2	-0.9
08508	12	V	500	27	0	0	3.3	-0.1	-0.1
08594	00	V	500	1	0	0	2.7	3.8	-4.4
08594	12	V	500	25	0	0	2.7	-0.5	-2.7
60020	00	V	500	19	0	0	2.7	0.4	-0.5
60020	12	V	500	26	0	0	2.2	-1.4	-1.1
71600	00	V	500	25	0	0	3.4	0.3	-0.2
71600	12	V	500	30	0	0	3.7	0.8	1.0
72201	00	V	500	23	0	0	2.5	0.0	-0.7
72201	12	V	500	27	0	0	2.8	-1.0	-0.5
72402	00	V	500	22	0	0	2.5	1.0	-0.6
72402	12	V	500	29	0	0	2.6	0.1	0.5
74494	00	V	500	24	0	0	2.3	0.0	0.5
74494	12	V	500	26	0	0	2.5	0.3	0.9
78016	00	V	500	22	0	0	3.6	-1.1	1.8
78016	12	V	500	27	0	0	2.4	0.0	0.1

APPENDIX I

1. The gross error limits for observation minus background differences of geopotential height in Tables 5, 10 and 11 are:-

Level (hPa)	Geopotential height (metres)
1000	100
850	100
700	100
500	150
400	175
300	200
250	225
200	250
150	275
100	300
70	375
50	400
30	450

The weighted RMS values used in Table 5,10 and 11 are calculated using the following weights:-

Level (hPa)	Weight
1000	3.70
850	3.40
700	2.90
500	2.20
400	1.90
300	1.60
250	1.50
200	1.37
150	1.19
100	1.00
70	0.87
50	0.80
30	0.64

2. The gross error limits for observation minus background differences of windspeed in Tables 6,12 and 13 are:-

Level (hPa)	Windspeed m s^{-1}
1000	35
850	35
700	40
500	45
400	50
300	60
250	60
200	50
150	50
100	45